FOOD MANUFACTURE

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Contents

	Page
Editorial	115
The Confectionery Industry. J. T. Stock, B.Sc., A.R.I.C.	119
Vitamins from Oils and Fats	122
The Food Controls of the Future. Specially Contributed	123
Ministry of Food—Latest Statutory Rules and Orders	127
The Milling Industry. A. J. Amos, Ph.D., B.Sc., F.R.I.C.	128
Technological Training	131
Citrus Fruit Juices Control	132
Food Technology	132
The Weakening of Self-Raising Flour on Storage. Thomas H. Fairbrother, M.Sc., F.R.I.C.	133
Meats from Australia	139
Impregnated Wraps for Fruit. R. G. Tomkins, M.A., Ph.D.	140
Correspondence	141
News	142
Information and Advice	151
Recent Patents, Trade Marks and New Companies	152

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Standards for Self-Raising Flour

SOME time ago the Minister of Food, on the advice of the Foods Standards and Labelling Division, issued S.R. & O., 1944, No. 44 which put limits on the total and available carbon dioxide permissible in self-raising flour. At first sight the determinations would appear to present very little difficulty. Similar specifications had been enforced in the case of baking powders, and the required tests carried out satisfactorily. In the case of self-raising flour, however, the estimation of carbon dioxide, particularly residual carbon dioxide, is much more complicated by the presence of the flour, which in certain conditions tends to lumping and coagulation. This results in the trapping or occlusion of varying amounts of the gas, and the figure obtained is low. We understand that on several occasions recently prosecutions have been threatened, but have had to be withdrawn because the official analysts have been forced to admit error. This state of things should not be possible. Perfectly honest manufacturers have been seriously inconvenienced (at a time when their technical staffs are already hard pressed) and their goodwill impaired because of doubt about results. On another page we publish an article, specially written for FOOD MANUFACTURE, by T. H. Fairbrother, M.Sc., F.R.I.C., who, after many years' experience as Chief Chemist to McDougalls, Ltd., may be regarded as an expert on the subject. In this article he gives exact and intimate details of two methods which he personally has proved to give consistently satisfactory results, and in addition a third method used by Dr. Kent-Jones which also has been demonstrated to be satisfactory. These details and methods should prove of assistance to official and other analysts, many of whom may be determining residual and available carbon dioxide in self-raising flour for the first time. He also gives some interesting details of experiments he has carried out to determine the extent of "running down" of gas content that may occur in self-raising flour through natural climatic conditions during storage. This possibility should certainly be borne in mind in fixing a minimum figure for the amount of available carbon dioxide.

Is Compulsory Heat-Treatment Dead?

The statement made by Colonel Llewellin, Minister of Food, in the House of Commons to the effect that further consideration must be given to the area schemes for the compulsory heat-treatment of milk before any of them can be put into operation is believed by the milk distributive trade to screen the fact that these schemes are virtually dead. More than 180 heat-treatment schemes have been submitted to the Ministry during the past sixteen months, but none of them has yet been approved.

Leaders of the distributive trade believe that one of the main reasons for the apparent shelving of the schemes is that there is no permanent legislation on which to base them. Legal authority for them is given by Defence (General) Regulation 55G, which is but a wartime measure; and if the Ministry of Food, at this stage of the war, were to approve any of the schemes, Regulation 55G might be swept away before they could be put into operation.

Not until a scheme has been approved can any progress be made with the erection of the buildings or the manufacture of the plant and equipment, and some of the schemes are estimated to cost £70,000. The schemes are being prepared by the local dairymen's wartime associations, which in many instances would also operate them. But these associations are temporary bodies. Most of them are due to be dissolved within one year after the end of hostilities.

Dairymen believe that permanent legislation will be necessary before any practical step can be taken towards the introduction of compulsory heat-treatment in any area.

Post-War Tax Relief

Food manufacturers will receive post-war taxation relief under the Income Tax Bill published by the Chancellor of the Exchequer. The proposals do not take effect until after an "appointed day" to be fixed by Parliament; but expenditure on buildings, plant and machinery after April 6, 1944, will qualify for the allowances.

There will be an initial allowance of 20 per cent. of the cost of plant and machinery, whether new or second-hand. The ordinary annual allowance is increased by one-fourth, instead of one-fifth as at present. Provision is made for earlier writing off if plant and machinery are scrapped or replaced.

Provision is also made for an initial allowance of 10 per cent. of the cost of new industrial buildings. This will be given to the industrialist if he constructs it for his own use, or to the landlord if he builds it to let to a firm. An annual allowance of 2 per cent. will be granted to write off the balance. Thus the cost of a new building will be written off in forty-five years.

There will also be an annual allowance spreading the cost of new patent rights acquired after the "appointed day" over seventeen years, or the life of the patent if shorter. Concessions are also made in regard to expenditure on research, including buildings, plant and machinery for research purposes.

The Bill gives effect to the pledge made by the Chancellor in his 1944 Budget speech, and in some respects goes beyond the scope of that speech.

Herring Board Refrigeration Plans

The Herring Board policy of establishing refrigeration plants at the principal Scottish fishing ports has been warmly welcomed by fishermen, who see in it a method of reviving and developing their industry.

The first freezing plant is to be erected at Frazerburgh and will, it is anticipated, be in operation by summer.

At first an experimental 100 crans will be frozen daily, while the balance will be sold on the market as at present. The success of the scheme will result in a very great development, and it is anticipated that at least 1,000 crans will be frozen daily when the season is at its height. It is also proposed to establish a freezing station at Great Yarmouth when the East Anglian fishing is at its height as another link in the chain, which aims at establishing freezing and refrigeration plants at every fishing port of any size in the country.

A levy scheme in the early stages of the scheme to finance its operation has been mooted, but it is anticipated that as the project develops the stations will not require this artificial method of subsidy but will operate on a commercial basis.

Herring to be so preserved will be supplied at the same price as is fixed for curing purposes. This development follows from the very important work which has been done at Torry, Aberdeen, by the Research Station there, and applies on a commercial scale the principles established in tests made over a period of years.

At a meeting held in Peterhead recently, when this plan was outlined, the Peterhead men were strongly in favour of the scheme and advocated the early establishment of a refrigeration station in that centre.

Wheat Content of Bread

In the House of Lords on February 28, the past and future rate of extraction of wheat for bread was debated, and the speakers were practically unanimous in favour of a high-extraction loaf.

The occasion was a motion by Lord Teviot to resolve "That in milling wheat the standard of 1942—*i.e.*, 85 per cent. extraction—should be regarded as the minimum compatible with the maintenance of the health of the people, and that if the extraction rate has been reduced below that standard it shall forthwith be restored."

Lord Teviot wanted to know when the reduction was going to stop and why it had been made at all. Both he and other speakers pressed Lord Woolton to tell them what authorities had advised it and what exactly they had advised. Lord Woolton, in reply, asked, "Where are we going to arrive if Ministers who are responsible to Parliament are to say what was the opinion of this adviser or that adviser? It was not a proper question."

With regard to the reduction of extraction in general, it was pointed out that although the effects on the composition of flour of the reduction from 85 to 82½ per cent. had been investigated, there was nothing at present to show the effect of the reduction from 82½ to 80 per cent. Stress was also laid on the matter of the loss of "unidentifiable factors." Research into new methods of milling, by means of which a newly discovered part of the germ could be extracted, were mentioned by Lord Horder and Lord Woolton. However, Lord Horder thought that the Government had "cashed in" already on these researches and done so rather hastily. He commented on the official statement that as a result of the first 2½ per cent. reduction last October the extraction of essential nutrients was "inappreciable." One could not go on using that word indefinitely, because one day some thinking person would ask, "How many 'inappreciables' go to an 'appreciable'?"

Lord Horder suggested that in the early days the opposition to 85 per cent. extraction bread was psychological; that people had broken their bad habit of eating white bread. He asked, "Are we going to ask them to unlearn that lesson?"

The matter of dental decay due to the eating of white bread came in for a lot of discussion. Lord Hankey complained that around 1935 there had been much advertising on diphtheria, V.D., and even the common cold, but none on flour. Such advertising was needed to help to "stop the rot in the nation's teeth."

Lord Woolton, at the conclusion of a lengthy reply, said that "we will not reduce the extraction rate below 80 per cent. until we are satisfied that it will not be detrimental from a nutritional point of view. We are convinced that the present reduction is not detrimental from the nutritional aspect, but should it prove to be so the Government will, of course, reconsider the position."

Science and Government

In a lecture on "The Place of the Scientist in Post-War Administration," arranged by the British Association of Chemists, Professor Harold Laski made a stirring appeal to scientists to fit themselves for the work of government.

He defined a scientist as a man who seeks to organise the relations between nature and his fellow human beings and to give them power to control nature. To achieve this the co-ordination of all sciences, including economics and politics, must be attempted on the largest possible scale. The man of science must understand the control of public affairs and the ordinary citizen must be given an insight into scientific methods. In industry the position is unfavourable for scientists, who are controlled by the financier, whose only concern is the making of money.

In industry and in the universities the scientists worked in a mental climate unfavourable to their social development. Trade unions have not made proper use of science. The miners, the textile workers, the iron and steel workers and many other unions should have their own scientific advisers, who should co-operate with the practical knowledge of the manual worker.

The understanding of science must be the spinal column of our educational system. We must shape the minds of the post-war generations in such a way that administration, at the highest level, can be undertaken by men with a knowledge of scientific method. There are many of our great scientists to-day who could hold their own with the best of the Permanent Secretaries of the Treasury, and if in future such men feel the call to administrative work they should not be denied the opportunity because they have not taken a brilliant degree in history.

The scientist of the future must study the economic pattern of the society in which he functions and get a real understanding of the historical background out of which public policy emerges.

Commercial Fruit-Growing

In the House of Lords some time ago an interesting debate on the grading, packing and distribution of fruit took place. It arose from Viscount Bledisloe's notice on the Paper, asking the Government to consider a small commission to visit the overseas Dominions and the United States in order to investigate and report upon the matter. The noble viscount said that the justification for such a mission was strongest in the case of the apple crop, the importations of apples before the war amounting to from 5 million to 7 million cwt. The preference for imported apples by home retailers could be attributed to the fact that they were dessert varieties, well graded and carefully packed. There was nothing in this country to be compared with the grading and packing stations in the U.S.A. and the Dominions. Viscount Bledisloe stated that, as far as he knew, suggestions contained in the very convincing writings of Mr. H. V. Taylor, in the Ministry of Agriculture's *Journal*, between the years 1921 and 1926 on the subject had not been implemented. If we are to grow fruit ourselves we must learn more about its preparation for the market, and this we can usefully do from those who have reduced the whole process to an exact science, to our own economic disadvantage.

In his reply, the Joint Parliamentary Secretary of the Ministry of Agriculture and Fisheries (the Duke of Norfolk) said that the Minister agreed in principle with the noble lord's suggestion, but at the present time he would prefer not to bind himself to any particular form of investigation. The Government will be ready in the future to play its part in encouraging the further development of good packing and grading, but he would emphasise that it is up to the industry also to play its part, and we shall look forward to a better grading system after the suggestions brought forward by Lord Bledisloe.

Distribution of Industry Bill

One clause in the Distribution of Industry Bill now before Parliament is of general importance to the food manufacturing industries. This is Clause 8, which provides that the Board of Trade must be notified of all proposals to erect buildings with an aggregate floor space exceeding 3,000 square feet and forming part of a new industrial unit. In certain areas the erection or extension of industrial buildings with an aggregate floor space exceeding 3,000 square feet is prohibited unless the permission of the Board of Trade has been obtained. This restriction does not apply to the replacement of accommodation which has suffered war damage. The Board of Trade may apply this restriction to any area in which the provision of further industrial premises would be seriously detrimental to the proper distribution of industry. Any such restriction order must be approved by Parliament.

Hospital Food

If there is one place where it would be expected that good scientific feeding would be the rule, it is the hospital. That all is far from well in this respect is gathered from a special article recently published in the *Lancet* (January 13, 1945). The subject is treated with considerable detail and, in the summing-up from which we quote, the general conclusion drawn is that the doctors are primarily to blame for not insisting that the needs of their patients are properly met. The hospitals are blamed because they have failed to appreciate the importance of correct feeding, and most of them have failed to place the responsibility for catering in the hands of a single experienced officer with sufficient influence to stake out a fair claim in the hospital income. While the buying of food is the responsibility of one officer and the cooking the responsibility of another and the distribution perhaps of a third, it is not possible to achieve a high uniform standard throughout hospital feeding. The result of this lack of unified control displays itself in many hospitals in:

(1) Failure to provide adequate meals throughout the day.

(2) Inexpert buying, and failure to use food obtainable in the open market.

(3) Lack of sufficient skilled kitchen staff, resulting in poor variety, careless seasoning and garnishing of dishes, absence of sauces, and the spoiling of good food in the cooking.

(4) Out-of-date equipment for cooking and service and lack of labour-saving devices.

In fact, we should gather from the article, fairly complete inefficiency.

Unsafe Meat

There were 126 outbreaks of foot-and-mouth disease in this country during the first ten months of 1944. The Parliamentary Secretary to the Ministry of Agriculture has admitted that these have been largely traced to imported meat, and it has been reported that one outbreak has been traced to some unboiled bones from meat imported from South America. It is an anomaly that whereas cattle or sheep suffering from this disease in this country are not considered fit for human food and have to be destroyed, similar diseased animals can be slaughtered abroad and the diseased meat sent here for consumption.

The important point arises whether meat from animals suffering from foot-and-mouth disease is fit for human food. If so, why do we destroy our own animals and why is foreign meat allowed to be sold?

Seaweed Research

Whatever the prospects of producing food products from seaweeds, the known prospects of other materials of related value (to mention transparent paper as one example) make the present activity of the Scottish Seaweed Research Association of considerable interest to the food industry. The appointment as Director of Research of Mr. Basil G. MacLellan, F.R.I.C., M.I.Chem.E., formerly for forty-two years the chief chemist with Messrs. Rowntree and Co., Ltd., marks the determination to make a very complete survey and to co-ordinate the work under an authority of experience and ability. The work will be largely investigatory in the two-year period, and be concerned with the volume of weed available, its life cycle, the best methods of collection and handling, and the analysis of the various types and their properties. This work will be carried on in Oban, the Association's headquarters, and at the laboratories in Edinburgh.

The Scottish Council on Industry is backing this enterprise, which has the support of a number of leading industrialists and technicians. The crux of the position might be the volume of available weed, since little prospect of a really important large-scale industry can be hoped for until it is assured of a continuing and sufficient volume of materials.

The Confectionery Industry

Progress in 1944

J. T. STOCK, B.Sc., A.R.I.C.

SINCE the introduction of the zoning scheme during 1943 there have been no major changes in the distribution of manufactured chocolate and sugar confectionery. The system of rationing has also remained unaltered and has continued to operate smoothly. In fact, the arrangements by which the output of the confectionery industry reaches the consuming public have amply demonstrated their efficacy, and are in all probability the most successful of all schemes involving rationed products. This is in no small measure one of the results of the excellent understanding which has continued between the trade war-time associations and the Ministry of Food.

Basic Raw Materials

In general there have been but few changes in the supply of raw materials, either in amount or in variety. A limited amount of egg albumen was made available for confectionery manufacture, although the small supplies made it necessary to restrict the allocations to manufacturers producing lines for which egg albumen is essential for the maintenance of output. Otherwise the supply position of this useful material has been far from easy. There have been several allocations of edible nuts, and this has helped to provide a little additional variety in the restricted number of lines being manufactured.

The exchange of ingredients within the allocation, such as that of sugar for corn syrup, treacle, and starch—and *vice versa*—which was permitted by the Ministry of Food, has allowed adjustments to be made in the proportions of the various basic raw materials taken up. This has been useful in promoting a degree of flexibility in the conditions of supply, in order that the revised demands of a modified production may be met, or that available labour may be utilised in the most economical manner.

Another concession made during the past year has been the granting of replacements for sugar, corn syrup, and certain other basic raw materials used in the manufacture of products for export to approved destinations. This is an encouraging sign; it may also serve as a pointer to the part the confectionery industry will be expected and will be ready to play in the recovery and the development of the nation's overseas trade during the years to come.

Flavourings

Although the supply position of certain of the essential oils has eased a little, that of many others seems to have become even more difficult. Notable in this respect is peppermint oil, which has been, and still is, in very short supply. The variations with origin in the nature and quality of this commodity are only too well known in normal times, and the present shortage has greatly accentuated the difficulties involved in maintaining a high uniform standard of flavouring. In some cases the quality of such supplies as have been available has been so poor as to necessitate cessation or restriction of the production of certain high-class lines.

Supplies of aniseed oil have been small and, when available, have commanded high prices. Allotments made under the essential oil scheme have been too limited to afford much relief to the difficult situation.

With regard to the spice oils, the state of affairs has been variable. Some, such as clove and nutmeg oils, have been readily available in excellent quality, while others, such as oil of cassia, have been almost impossible to obtain. Imported cinnamon oil was in very short supply in the early part of the year, but the supply position was later somewhat eased by the new allocation.

Fig. 1.—Small Size Mixer for Experimental Batches.

Courtesy of Hobart Manufacturing Co., Ltd.

Vanilla beans have continued to be in short supply, a situation which has been reflected in the amount of first-quality essence available. Fortunately, such deliveries as have been made have consisted, in general, of beans of good quality, so that the aristocratic flavour of fine, natural vanilla still serves to hall-mark high-quality confectionery, despite the shortage and the high price consequent upon this.

The quantity of fruit available for the manufacture of essences and concentrates has again been disappointing. In the case of home-produced fruits, no allocation has been made for the production of flavourings, so that the supply of fruit concentrates has been small and limited in range, severely restricting the employment of these most useful products.

Despite the many acute shortages, only a few of which have been quoted as examples, the British essence and flavouring industry has shown a commendable reluctance to admit defeat in face of difficulties which have at times seemed almost insuperable. With so many of the natural raw materials being for all practical purposes completely unobtainable, the natural trend has been towards flavourings of artificial nature. Such products are, of course, by no means new; the general tendency has been to concentrate upon improvement in quality. Intensive research has in some cases produced flavouring materials which begin to rival those obtained from natural sources. Owing to their uniform strength and quality, great stability, and keeping properties, certain of the more exceptional artificial flavourings have certainly come to stay.

Scientific and Technological Progress

As in so many other industries, there is a growing appreciation of the assistance which can be rendered by scientific control. As, however, the making of good confectionery is very much of an art, it is hardly to be expected that the scientist alone will be able to produce the finest products with the greatest economy both in labour and material. It is in the whole-hearted co-operation of the scientist with his production colleagues that the best results are to be obtained, and it may be said that one of the few beneficial results of these years of shortages and restrictions has been the encouragement of this method of working, to the benefit of both parties and hence to the industry in general and the public which it serves.

In this connection the installation in or near the laboratory of equipment making possible the processing of semi-scale batches serves to eliminate many of the "teething troubles" which are so often encountered when production of a new line is attempted for the first time. Similarly, the puzzling instances of persistent or of intermittent trouble which sometimes occur may be frequently diagnosed by preparing batches under rigidly controlled conditions on the laboratory semi-scale plant. Further, there is no firmer ground upon which laboratory and factory personnel may meet than when working jointly along such lines as these, and the decisions taken will be based on sound fundamental reasoning as well as being practicable to carry out. A good example of the type of equipment which is so useful for semi-scale work is the mixer shown in Fig. 1. Since this has a capacity of 3 quarts, it is possible to prepare a batch of useful size, while the range of beaters, whisks, and other attachments available permits a wide variety of products to be handled. Unfortunately, the manufacture of this, in common with that of many other small-capacity units, has had to be temporarily suspended owing to the necessary concentration upon larger sizes for high outputs.

Instrumental Methods

On the purely control side the time-saving possibilities of instrumental methods are being realised to an ever-increasing extent. Robust dial- and recorder-type thermometers of narrow working range permit easy and accurate reading of temperature under adverse conditions, and thus permit closer control and the production of a more uniform product. Instruments which up to a few years ago were rarely seen outside the laboratory are being used increasingly under factory conditions. This has been made possible by steady improvement in design, whereby many once-delicate scientific instruments have been rendered much more portable and robust without loss of sensitivity. In many cases a simplification in operation has also been achieved, so that measurements may be made rapidly without fear of error. Such instruments permit observations to be made while a batch is actually in course of manufacture, and are valuable not only in the control of processing, but also as indicators of any abnormalities. The large direct-reading refractometer shown in Fig. 2 is an interesting example of this type of instrument. Since no manipulation other than the placing of a little of the sample, duly strained through muslin, on the prism face is required, the refractometer is very useful in following such operations as the production of syrups, jams, and similar lines. The result is read off directly in "percentage of soluble solids" on a large illuminated scale. The import-

Fig. 2.—Projection Refractometer Reading Directly in Percentage Soluble Solids.
Courtesy of Bellingham and Stanley, Ltd.

Fig. 3.—Portable *p*H Meter.
Courtesy of Cambridge Instrument Co., Ltd.

ance of the degree of acidity in influencing such factors as gelling, graining, etc., has long been realised, but measurements of its intensity generally had to be confined to the laboratory. The development during the past few years of portable "*p*H meters," using sealed electrode systems, an example of which is shown in Fig. 3, has rendered it possible to carry out measurements in the factory with considerable ease.

Flour Confectionery

Apart from the questions of flavouring and of nutritive value, the incorporation of egg into a cake batter has a profound effect upon the physical properties of the resultant product. Accordingly, egg and egg products are of vital importance in flour confectionery. Supplies of shell and frozen egg being almost non-existent, interest in obtaining the most successful results with the dried product has been continued at a very high level. From the users' point of view two sources of difficulty may be mentioned. The first is the manner in which various deliveries differ in ease of reconstitution. The second is the difficulty of predicting the probable performance in baking, whether by rule-of-thumb method or from physical and chemical determinations made in the laboratory. Both of these problems are closely connected with that of grading, which has been the subject of much study during the past few years, and upon which research is still very active. Another promising line of attack has been the production of sugar dried egg, which is manufactured by incorporating sugar into the mass before subjecting to spray drying. This method prevents the denaturation of the protein of the egg, and the product has improved reconstitutive, beating, and baking properties. It has been claimed that sugar dried egg is as good as frozen or even shell egg in cake-making.

Utilisation of Fat

The question of the best methods of using the various forms of fat which are allocated has also continued to attract attention. Allocations of dehydrated butter fat in place of butter caused some manufacturing difficulties, as did issues of lard in place of other fats. In some cases the difficulties were surmounted by changes in recipe or method of preparation, while other users found initial processing of the fat, such as the incorporation of a percentage of water, flour, etc., to be preferable. Another point which has had to be considered is the differing water content of the various fats, ranging from practically nil in the case of butter fat up to about 16 per cent. in the case of butter and margarine. Apart from the point of view of the balancing of the recipes, the requirements of the Cake and Flour Confectionery Order, with the limitations which it imposes on the percentages of fat and sugar, have had to be borne in mind.

Jam and Fillings

Since the production of Swiss rolls and sponge sandwiches affords a means of obtaining a little variety in a manner which is neither forbidden by

Fig. 4.—Mixer with Air Whip Attachment.
Courtesy of Hobart Manufacturing Co., Ltd.

law nor impossible through shortage of supplies, jams and similar materials have acquired a new importance in the eyes of the confectioner. A jam or other material to be used for filling can be most satisfactorily utilised if its characteristics are adjusted to suit the conditions under which it is to be employed. Thus the texture should be firm enough to prevent uncontrollable flow, but not so firm as to cause difficulty in spreading through tearing of the cake base. By correct adjustment of boiling, pectin content, and acidity it is possible in the case of jams to maintain the output of a uniform product of the desired consistency.

The few items mentioned above are typical of the many the manufacturer of flour confectionery has had to face, quite apart from actual rationing of available supplies. In the light of these difficulties it is not easy to understand the divided opinion which seems to exist in the trade as to the desirability or otherwise of forming a central Bakery Research Association, which could investigate and advise upon such problems.

Plant and Equipment

No major developments have been brought to the notice of the author during the past year. It is known, however, that a considerable number of improvements affecting all branches of the confectionery industry are envisaged and are in some cases in the course of design. Depletion of technical staff and preoccupation with priority work naturally impede progress at the present time. It seems that when the cessation of hostilities removes these and other difficulties little time will be lost in going ahead with the ideas projected.

Aerating and whipping processes are of great importance in the industry, hence perhaps it may not be out of place to refer to an interesting type of mixer which, although developed a few years ago, is still in its infancy as far as use in this country is concerned. By means of a small compressor unit, air is forced into a chamber in the bottom of the mixing bowl as shown in Fig. 4 and, escaping through a series of small openings, becomes uniformly distributed throughout the batch, producing adequate aeration without danger of over-mixing.

Vitamins from Oils and Fats

MOLECULAR distillation on a commercial scale has been developed during the past few years, and may be regarded as a comparatively new method for the separation of organic materials of high molecular weight into their various fractions or constituents. One of its most interesting applications is the separation of the vitamin fractions from vegetable and fish oils. This is now done in the U.S.A. on a fairly large scale for the production of concentrates of vitamins A and E. For example, in 1943 about 2,5000 tons of shark liver and other liver oils were distilled by this method, in order to separate out the odorous constituents, the vitamin fractions, and the bulk of the original oil which would then be in a sufficiently purified condition for food and other purposes.

Further progress was made last year, and the method promises important possibilities in many fields of applied organic chemistry, such as plastics and plasticisers, sugar derivatives, synthetic lubricants, etc. There are, of course, other and older methods of separation, such as solvent extraction and fractional crystallisation, and it has not yet been finally determined that these can be effectively replaced in every case by the newer process of molecular distillation.

The first step in this development was taken by an Englishman, Mr. C. R. Burch, whose ideas were developed in this country by the I.C.I. and British Drug Houses. Recent progress over here is hidden under the usual veil of secrecy, and it is at present only possible to refer to the work undertaken in the U.S.A. mainly by Eastman Kodak, who, together with the General Mills concern, have pooled their interests and formed a joint subsidiary, Distillation Products Inc., for the manufacture of products by molecular distillation, such as vitamin concentrates, and for the design and construction of the requisite high vacuum apparatus. It may be explained here that this method of distillation consists briefly in operating under high vacuum in such a way that the vaporised molecules have but a short and unobstructed path to a cold condensing surface.

But this comparatively simple-looking operation has been fraught with many practical difficulties in its accomplishment, and Dr. Hickman and associates of the Eastman Kodak Co. have spent some years in the development of a satisfactory commercially feasible plant. One of the earliest ideas in this direction was the use of the falling film type of still, in which the thinnest possible film of liquid flows downward over a centrally heated evaporating cylinder concentrically placed within a cylindrical jacketed or air-cooled condensing surface. Considerable difficulty was encountered, however, largely due to the highly viscous nature of most of the materials to be dealt with. Some improvement was at length secured by use of the centrifugal disc of shallow conical shape, which would receive the material at the centre of its concave surface and discharge the residue around the periphery.

Full details are not yet available of the latest improvements, but they include the design and construction of a 5-ft. still, with a truncated conical evaporating surface and a special type of condenser, and a unit capacity of 500-1,000 lb. per hour. The smaller stills of 14 inches diameter are, however, being used for the present for the production of vitamin E, and the 32-inch stills for vitamin A from fish liver oils.

Further improvements may consist in the design of multiple type apparatus, using, *e.g.*, a series of rotors and condensers for successive distillations within a single unit; or possibly a series of different temperature zones in the same rotor, capable of producing several fractions therein. Encouraging results are said to have been achieved in this latter respect at the Mellon Institute, with work sponsored by the Gulf Oil Corporation. Another useful suggestion is that of selective partial condensation, employing a warm condenser, which will condense the less volatile molecules and reject the more volatile.

The Food Controls of the Future

Part I

This series of articles on British food controls is merely the first round of what may prove a protracted and hotly contested controversy. In the opinion of the authors, it is high time to start examining the validity of the arguments for and against controls and to suggest practical solutions of the problems arising Adopting a thoroughly realistic approach, the authors state that they have attempted to relate the different problems to hard economic facts.

SPECIALLY CONTRIBUTED

IT HAS become the fashion in some quarters to commend highly the achievements of the Ministry of Food and the conclusion is often drawn that it should be maintained, in a suitably modified form, as a permanent Department of State. But can a Ministry of this nature be more than a wartime expedient? It is first necessary to summarise the arguments that have been advanced by the ardent supporters of the Ministry, which run somewhat as follows:

(1) Partly through the operation of the Ministry (and partly, it is admitted, through the relatively high level of employment and wages), it has been possible to keep most families in the country well fed. There is a more equitable distribution of food than there was before the war; and, indeed, many families are better fed than they were when the market was unrestricted.

(2) In a manner far beyond the scope of any pre-war authority, the Ministry attempts to adjust both total food supplies and individual provision to the physiological needs of the public.

(3) In various ways the Ministry manages to guarantee to the consumer the quality of the food he purchases; this is a public service that should be rationally expanded.

(4) The Ministry promotes and supervises much useful research into the preparation, the storage and the cooking of foods, and it is plainly in a position to co-ordinate the work of a large number of laboratories.

(5) It further exercises a wholesome and pervasive influence upon the public taste through its schemes of advice and instruction; and so valuable an influence should not be suspended at the close of the war.

(6) From the point of view of the primary producer, the Ministry is the final authority that, in consultation with the Ministry of Agriculture, provides a system of guaranteed prices to the farmers; and it is difficult to see what authority could undertake so efficiently what the farming communities, both at home and overseas, eminently desire.

(7) To the producer again the Ministry appears to be relatively non-restrictive in its outlook, since its aim is to encourage by all means the consumption of high-quality "protective" foods.

(8) Finally, for the home producer the Ministry seems perhaps the best instrument that has yet been devised for adjusting the proportions of home and overseas supplies and relating them to the dietetic needs of the public.

Purchasing Power and Freedom of Choice

These are weighty arguments; yet we must examine them with reserve. No doubt, for example, the dietetic well-being of the public has been fully maintained, but we must certainly admit that this has been partly due to the high level of purchasing power. Unless we assume that the Government is honest in its intention to pursue after the war a policy of high employment and adequate wage levels, we cannot expect a permanent Ministry of Food to be of much service to us. It seems unlikely that any Ministry of Food could do more than apply, through schemes of differential prices, a temporary brake to falling standards of living, where these were consequent upon a rapid increase in unemployment.

The distinction is an important one, because it is necessary to avoid any temptation to think of the country after the war as existing *permanently* in a state of food shortage; and it is frankly difficult, where there is no food shortage, to visualise the precise functions of a Ministry of Food. The present Ministry emerged, not merely because we were engaged in a war, but because we were engaged in a war that was accompanied by a serious restriction of our supplies of food. No method of dealing with such a situation has been contrived, save the method of inclusive control and rationing. It might, indeed, be argued that, if food supplies became at any time restricted through some cause other than that of war, a measure of control would be equally desirable. But until we experience a shortage of this nature, do we need a Ministry?

A further point we must appreciate is that food was arbitrarily selected for this special treatment, because food plays so significant a part in our daily

life. The reason was, in fact, originally a physiological one; and it became embodied in the phrase, "Food is a munition of war." There could otherwise have been no excuse for removing food from the commodity market as a whole for this peculiar treatment; and, of course, at a later stage the principle had to be extended to other necessities of life, such as clothing. But can we argue from this that in peace-time we should be justified in removing all the main foodstuffs from the commodity market and earmarking them for special treatment? What would be the object? After all, people should be permitted to exercise some freedom of choice in their food, and in a period of high purchasing power and adequate supplies of food there would be nothing but ignorance to restrict them from choosing a wholesome diet.

It is true that, if we conceived the control of our food supplies to be a sound method of doing business, we might in theory decide to extend the principle to clothing, fuel, housing and household utensils. There is nothing to prevent a nation from making such an experiment, if it so wishes. But there seems no obvious justification for limiting the principle to food alone. The commodity market is, in many respects, closely bound together, and a procedure of this kind might, in time of peace, have a very disturbing effect upon our economy.

Basic Assumptions

Our first task, beyond all question, is to visualise the post-war conditions, for which Parliament will be called upon to legislate. We must free our minds from any obsession with the war-time economy, to which we have inevitably grown accustomed. Moreover, a definite assumption will have to be made; and our assumption here is that we shall not pass, within any measurable time, into a socialised or collectivist economy. If we do experience such a revolution in our affairs, it will automatically involve far more than our methods of handling and distributing food; and while we might be presented with a number of problems for solution, they would plainly be of a very different order from those with which we are now concerned. We assume, in brief, the continuance of a "competitive" economy.

We do also assume that the State will have to intervene far more generally in the solution of our economic problems than it did before the war; and our *real* task is to discover precisely to what extent it is practicable and desirable for the State to intervene in the field of food manufacture and distribution. It is this sphere of manufacture and distribution, the sequence of events from the moment the foodstuffs leave the farm to the moment they are sold over the retail counter, that has been the special concern of the Ministry of Food. What about their post-war relation to the State?

Now, quite a number of schemes and measures have been incidentally adopted by the Ministry, all of which could presumably be detached from the Ministry itself and grafted on to some other Department, as, for instance, such beneficial schemes as the provision of milk and vitamin foods to certain categories of consumers, the promotion of social meal services, the control of foods enriched with vitamin and mineral supplements and the encouragement of public instruction. These schemes might severally be attached to other Ministries—that of Education, for example, or Health or Agriculture. They might lose something in the process, but administratively the operation would not be difficult. It is not with these incidental attributes of the Ministry of Food that we are concerned, but with the broader problem of the intervention of the State in our whole food economy. The schemes are beneficial, and everyone agrees that they should be preserved in some form. It is possible to go further and say that, if we *do* decide to retain a centralised Ministry of Food, all the schemes were better organised within it and not dispersed among four or five other Departments. But on that we can speculate later. What is desired now to point out is that we might list a number of beneficial measures and plead for their survival without suggesting how they are to be administered and without touching the main problem, which is an industrial and commercial one.

The Ministry and the Trades

The usual reason offered to explain the unwillingness of the State to interfere with the free market in food is that it will encounter the opposition both of the private merchants and manufacturers and of the co-operatives. There may be some truth in this. But from the point of view of an economist the real reason is that a "competitive" economy must be granted considerable freedom of investment and expansion if the system is to work with any degree of efficiency. When the war-time controls were imposed upon the free trades it was understood that they would subsequently be relaxed again and the free market restored. It was on this understanding that the partnership between the Ministry and the trades was established. Certainly the Government might even now decide to perpetuate the controls indefinitely. But we must be quite clear, if it did so, that the system of independent manufacturers and wholesalers would in time completely disappear and its place be taken by a system of more or less salaried *personnel*, who, however contented they might be in their work, would function as the conscious agents of the State. It has already been shown that food cannot be isolated from the whole commodity market for this special treatment.

It may be agreed, on the one hand, that it is necessary to preserve all that is possible of the

benefits of the Ministry, but, on the other hand, we must undoubtedly design fresh machinery for the purpose and adapt that machinery to the structure of a peace-time economy. Reference was made above to legislation, and it would be idle to deny that whatever is ultimately proposed will have to be embodied in a Government White Paper and in a Bill introduced before Parliament. We shall have no opportunity of drifting out of war into peace "in a fit of absentmindedness." The Ministry will not modify itself gradually, through some kind of internal and self-adjusting mechanism, until it assumes at last the precise form we require it to adopt. It possesses no such self-adjusting mechanism. It is a war-time Ministry. If we are to have a Ministry of Food after the war the whole structure of the existing Ministry will have to be analysed into its component parts and these reassembled, shaped, and integrated into an entirely new Department.

It is perhaps necessary here to point out that to most administrators and economists the task of planning the technical stages of decontrol is a far more attractive one than that of designing the specifications for a new Ministry. Decontrol is by no means a simple process; its stages have to be even more accurately timed than have the stages of control during the early period of the war. But it is to the economist a relatively clear-cut job, that of winding up the Ministry, until any business still remaining can be safely handed over to other Departments. At the close of the last war a few suggestions were made by the Ministry for the continuance of some of its functions, but the suggestions were not apparently advanced with any degree of conviction and the Government of the day paid them little attention. At the end of a long war, men who are engaged in solving the day-to-day problems of administration may well find their creative faculties somewhat exhausted, and unless we realise that our task is to plan an essentially *new* Department we shall merely have a repetition of the last post-war process of liquidation.

Any scheme that is set forward must be coherent, but it must also be flexible. It is the business not of economists but of the Government to plan and legislate. The economist can only indicate the broad outlines of the problem and should avoid anything in the nature of a "blue-print" for post-war prosperity. But the scheme should begin by considering the economic situation with which we shall be faced after the war, and it must end by being submitted to Parliament at a sufficiently early date to allow its terms to be fully discussed and comprehended.

Nature of Control

There is at least one definition that must be given —that of the word control. The present Ministry exercises control over the movement of foodstuffs through the market; it is not, indeed, too much to say that the Ministry is, in essence, a system of controls. Most people would define the Ministry as an organisation for the rationing of food and the fixing of prices, but, in fact, the need for rationing and price-fixing was merely the occasion that called the Ministry into existence. Its basic task is that of establishing control, since without control there would be no rationing.

The Ministry imposes its control by acquiring through purchase the whole stock of the foods affected, either directly or by the offices of licensed traders who act as the Ministry's agents. This power of acquisition is probably an essential feature of any scheme of full control, even if the Ministry's hold on the supply is only a momentary one. Any attempt at rationing, in time of shortage, that is not accompanied by an adequate system of control would be relatively ineffective.

Do we need control of this kind, involving the physical acquisition of the foodstuffs, in time of peace? Those who are impressed with the benefits we have derived from the Ministry leap immediately to the conclusion that these benefits are all associated with the present system of control. As far as the war is concerned they are right, in that without adequate control the benefits would not have accrued. Where they are wrong is in the assumption that a country cannot have a Ministry of Food unless that Ministry is controlling all the essential supplies of food through powers of acquisition.

For, when all is said and done, what is the existing Ministry? It resembles in its operations a large business concern; it might almost be described, allowing for many distinctions, as a type of "super-monopoly." Apart from its power of enforcement, its administrative practice approaches that of a large commercial enterprise possessing a vast number of subsidiaries. To perpetuate the Ministry *in its present form*, therefore, is to create a permanent food "monopoly" which might behave as does any other monopoly, with one significant difference—that it possesses a Minister who has been entrusted with the care of the dietetic well-being of the public and who is answerable to Parliament for that trust. The distinction may be a very important one; but that, in the last analysis, depends upon the composition of Parliament.

Curiously enough, it is often those who advocate a system of permanent controls who appear most convinced that the controls themselves are directed by men who have commercial interests in flour, bacon, fats and so on. It is strange, then, that they advocate a plan that might tend to bring some rigidity into the process of food manufacture and distribution. It has been already indicated that, if the controls are now staffed by men with interests in the trades they control, such men would presumably be replaced after the war by salaried civil servants. But what constitutional safeguard have

we to prevent a Ministry of this nature from adopting at times some of the least desirable practices we associate with monopolies?

In brief, the difference between a war-time Ministry and its peace-time counterpart must be made clear, and the difference lies in the fact that a peace-time Ministry cannot be conceived as a system of *control by acquisition*. It might be in a strategic position to assume control over one foodstuff or another if that were in the public interest, and that it would be the instrument of regular State intervention in the food market is quite certain, since there would otherwise be no reason for establishing such a Department. But control of the type with which we are now familiar seems out of the question.

Protection of the Consumer

There is one characteristic of the existing Ministry of Food which would presumably be retained in any peace-time Ministry. The Ministry is definitely a "consumers'" Ministry, in the sense that it was constituted for the purpose of safeguarding the dietetic interests of the community in a period of shortage. No doubt in practice the task of the Minister has been to keep the balance between his scientific advisers and the trading interests. No doubt, too, there have been extraneous factors, such as the shipping, labour or petrol situations, that have had from time to time a decisive influence on policy. But the fusion of science and commerce within a single Ministry has had the effect of awakening among some of the trading and manufacturing interests a certain appreciation of the dietetic principles involved, and the influence upon the public has been equally marked. This influence might, as far as the food trades are concerned, be no more than ephemeral unless the conditions that created it are embodied in a permanent Minister. Such readiness as there is in the trades to co-operate with the State for the general good would have to be caught and nurtured while it is still fresh. But there is ultimately no obvious way in which the whole fusion can be perpetuated except through the medium of a Minister, who can negotiate with the trading interests and who is known to possess reserve powers for the protection of the consumer.

A word should here be said on the concept of producers' marketing boards with so-called consumer representation. In practice this has never been satisfactory, since there can be no such thing as a typical consumer of food. The idea of a Consumers' Council is open to the same criticism. Where the whole public is involved, its interests can be protected only through a Minister responsible to a House of Commons elected by the same public. This is elementary political theory, but it is worth a brief mention because the idea of producers' and distributors' boards with consumer representation is already being canvassed in some quarters.

We have now to consider the nature of the world for which we shall be devising our food policy. Let it be made clear that the general condition of the country, as it will be after the transition from war to peace has run its course, is here being discussed. Until the process of transition is complete, even though it be a matter of years, some of the war-time controls must remain. After the experience of decontrol following the last war the principles of a transition period should, we may hope, be fairly well understood. The important thing for a Government is not to be led by political or industrial considerations to decontrol prematurely. Before decontrol can be safely effected the supply position must be assured and there must be a reasonable certainty that decontrol will not be accompanied by a rise in prices at some point in the long sequence of distribution.

Post-War Conditions—Monopolist Tendencies

What we are obviously concerned with here is the policy of maintaining low and stabilised food prices, which is complementary to a policy of high employment and adequate purchasing power. The problem has been referred to in the White Paper on Employment in the following terms (Para. 52): "Stability of wages and stability of prices are inextricably connected. If the general level of wage rates rises and there is a corresponding increase in prices of goods for civilian consumption, the individual wage-earner will be no better off and there may be no increase in the total amount of employment available." Employment and price levels thus react upon one another, and it follows that State intervention to stabilise high employment must be accompanied by State intervention to reduce and to stabilise food prices.

While the standard of nutrition maintained during the war has been partly due to the high level of employment and wages, it has been due in equal proportion to our policy of "pegging" food prices. This has been made possible through the Ministry's control system and through the liberal use of Exchequer subsidies. By appealing to subsidies we can always prevent a price rise provided we also control prices, and how far such an appeal might be legitimate in time of peace will be considered later. For the moment we are discussing the cause of high food prices.

(To be continued)

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, November 1, 1944, page 406.

No.	*Date.* 1944.	PRICE FIXATION ORDERS
1089	Sept. 19.	(Control of Undertakings) (Charges) Amendment Order. [Emergency Powers (Defence) Act, 1939, S. 2]
1097	,, 22.	Green Vegetables (Maximum Prices) Order. Revokes S.R. & O. No. 1410.
1098	,, 22.	Order amending the Pulse (Control and Prices) Order, 1943.
1114	,, 28.	Order amending the Pearl Barley (Control and Maximum Prices) (No. 2) Order, 1943.
1139	,, 30.	Order amending the Salmon (Maximum Prices and Distribution) Order, 1944.
1146	Oct. 4.	Order amending the Cereal Fillers (Control and Maximum Prices) Order, 1944.
1147	,, 4.	General Licence, under the Dried Fruits (Control and Maximum Prices) Order, 1943.
1149	,, 5.	Order amending the Wheat (Control and Prices) (Gt. Britain) Order, 1944.
1165	,, 11.	Fish (Maximum Prices) (No. 2) Order.
1173	,, 13.	Fish Sales (Charges) (No. 2) Order.
1201	,, 24.	Imported Apples (Maximum Prices) Order. Revokes S.R. & O. 1943 No. 1483.
1202	,, 24.	Potatoes (1944 Crop) (Charges) Order.
1209	,, 26.	Order amending the Milk (Maximum Prices) (England and Wales) Order, 1943.
1231	,, 31.	Potatoes (1944 Crop) (Charges) (Amendment) Order.

		CEREALS AND CEREAL PRODUCTS
1035	Sept. 1.	Cereals and Cereal Products (Licensing Control) (Dealings Abroad) Order. Revokes S.R. & O. 1939 No. 1035.

		FEEDING STUFFS
1086	Sept. 18.	Feeding Stuffs (Regulation of Manufacture) Order. Revokes S.R. & O. 1943 Nos. 441, 1237 and 1738; and 1944 Nos. 296 and 553.

		FISH
1156	Oct. 6.	General Licence.
1369	Dec. 9.	General Licence.

		FLOUR
1088.	Sept. 18.	Order amending the Flour Order, 1944.

No.	*Date.* 1944.	FRUIT
1169	Oct. 12.	Order amending the Fruit Pulp Order, 1944.

		ICE CREAM
1280	Nov. 16.	Order revoking the Ice Cream (Prohibition of Manufacture and Sales) Order, 1942. Revokes S.R. & O. 1942 No. 1962. Spent.

		KITCHEN WASTE
967	Aug. 12.	Licensing of Private Collectors (Extension No. 2) Order.

		LABELLING
1447	Dec. 28.	Labelling of Food (No. 2) Order. (1943 No. 1553. Reg. 2.)

		MEAT
1358	Dec. 6.	Order revoking the Meat (Addition of Preservative) Order, 1941, the Margarine (Addition of Borax) Order, 1940, the Bacon (Addition of Borax) Order, 1940, and the Condensed Milk (Milk Content) Order, 1940. Revokes S.R. & O. 1940 Nos. 547, 982, 1833 and 1896; 1941 No. 1395; and 1942 No. 1372.

		MILK
1210	Oct. 28.	Directions supplementary to the Milk (Control of Supplies) Order, 1942, and the Milk (Control of Supplies) (Scotland) Order, 1942.
1281	Nov. 16.	General Licence, under the Use of Milk (Restriction) Order, 1941. (Ice Cream.)

		POINTS RATIONING
1164	Oct. 11.	Order amending the Food (Points Rationing) Order, 1944.

		POTABLE SPIRITS
1103	Sept. 25.	Potable Spirits (Licensing and Control) Order. Revokes S.R. & O. 1940 No. 472.

		POTATOES
1094	Sept. 22.	Potatoes (1944 Crop) (No. 2) Order.
1095	,, 22.	Order amending the Potatoes (General Provisions) Order, 1944.
1194	Oct. 20.	Order amending the Potatoes (1944 Crop) (No. 2) Order, 1944.
1407	Dec. 15.	Order amending the Potatoes (1944 Crop) (No. 2) Order, 1944.

The Milling Industry

Progress in 1944

A. J. AMOS, Ph.D., B.Sc., F.R.I.C.

THE author's previous two annual reviews of the milling industry have recorded the introduction of modifications into the technique of the milling process, which previously had become more or less stereotyped in character, with the object of producing an 85 per cent. extraction product which was more of the nature of a flour than of a meal. The outcome of this practical research by the milling industry was a remarkable advance in the technology of flour milling, but towards the end of 1943 progress had reached a stage which left little room for further material improvement in the milling of an 85 per cent. product. Had the official extraction been raised above this level during 1944, there might have been both an incentive and a scope for further technological developments, but, as no such move was made, the actual practice of flour milling calls for no special comment in the present review.

Nature of Wheat Grists

The composition of the wheat grist is not a matter of choice for the miller, but is prescribed by the Cereals Division of the Ministry of Food. It is periodically modified according to the wheat situation, but every effort is made to ensure that at any period the mills of the major part of the country are working on the same wheat blend. The two main components of millers' grists have continued to be good grade (No. 1 or No. 2 grade) Manitoban wheat and home-grown wheat, but the relative proportions in which these two constituents have been present in the blend have varied from time to time according to the quantity of home-grown wheat available. Thus in April the wheat blend had to contain a minimum of 55 per cent. home-grown wheat, whereas by the middle of July this minimum had been reduced to 30 per cent.

A certain amount of Plate wheat and of Durum wheat has also been available, and millers have been permitted to incorporate either or both of these wheats in the blend. The official instructions have, however, required that the total proportion of such wheats in the grist should not exceed a specified maximum and should replace equal parts of Manitoba and home-grown wheat. During the greater part of 1944 this maximum proportion was fixed at 10 per cent.

The restriction of the imports of Manitoba wheat to the two top grades has ensured that the strong component of the mill grist has been a sound wheat which has "yielded" well and which has contained comparatively few impurities. These two factors are, of course, particularly desirable when an attempt is being made to produce a white type of flour at an extraction level as high as 85 per cent. The strength and protein content of the Manitoba arrivals have been satisfactorily maintained throughout the year and have fallen within the ranges expected for these grades.

The arrivals of Plate wheat have, in the main, been normal and satisfactory for this type of wheat in strength and protein content. They have been good "filler" wheats and generally have differed in strength but little from a mixture of equal parts of Manitoba and English.

The Durum wheat received during 1944 was normal in general characteristics; it was rather weaker than the Plate wheat and furnished the usual rather stiff and claylike dough. This lack of balance in its gluten characteristics was, however, relatively unimportant, since the wheat was employed in only a restricted proportion and in grists containing a high percentage of weak English.

The home-grown wheat harvested during 1944 exhibited the usual range of strength and protein content, and in these respects calls for no special comments. Unfortunately, however, much of the crop, particularly in certain districts, became subjected to conditions which rendered it unfit for bread-making purposes, and the milling industry found itself confronted with a serious and perplexing situation. This problem will be discussed in detail later in this review.

Dilution and Fortification

Dilution of the wheat grist with cereals other than wheat was made compulsory at the end of 1942. During 1943 the authorised diluents were barley, rye, and oat products, and at one period the level of dilution reached 10 per cent. By the beginning of 1944, however, this had been reduced to 2½ per cent., and shortly afterwards the use of barley and oats was discontinued. During the major part of 1944, therefore, the only form of dilution in operation was the incorporation in the wheat blend of 2½ per cent. rye.

The mixing in of imported flour to National flour was continued in 1944, but, in addition to the Canadian flour, both Plate and U.S.A. flour were used for this purpose. The total proportion of imported flour which had to be present was varied from time to time and ranged from 5 to 12½ per cent. The manner in which the total proportion could be divided between the three types of imported flour was also varied; a greater relative

proportion of Plate flour was permitted when the home-grown wheat content of the blend was comparatively low.

The addition of milk powder to National flour was discontinued in March, 1944, but fortification with creta præparata continued and is still compulsory. The proportion in which this substance has to be added to National flour has remained unchanged at 7 oz. per sack of 280 lb., but, owing to the physical nature of creta, its automatic addition to flour at a constant rate gives rise to difficulties, and occasionally samples are encountered which exhibit a creta content appreciably different from the statutory requirement. Flour which is intended for purposes other than bread-making, such as self-raising flour and biscuit flour, need not be fortified with creta, although the addition of the statutory proportion of this substance can be made by the miller if he wishes. Fortification with creta is optional also with respect to meals and licensed speciality flours.

Difficulties with Home-Grown Wheat

A very considerable proportion of the 1944 crop of home-grown wheat underwent a serious deterioration after it had been cut, and in the Midlands and the North much of the wheat was rendered unsuitable for bread-making purposes. The cause of the deterioration was the occurrence of rains during the period in which the cut wheat was lying in the fields, while the increased acreage under wheat and the scarcity of labour intensified the detrimental action of these unfortunate climatic conditions. The thorough wetting which the wheat thus received caused germination to commence, and in many instances it had proceeded to an appreciable extent by the time the wheat was threshed. Germination is accompanied by a marked increase in the enzymic activity of the grain, and flour milled from sprouted wheat is well above normal in diastatic and proteolytic activity. The enhanced activity of these enzymes tends to cause stickiness in the dough and in the crumb of the bread, while in severe cases the loaf may collapse on leaving the oven. Stickiness in the crumb and loaf collapse are the result of excessive alpha-amylase activity, whereby an abnormal conversion of starch to dextrin occurs during the earlier stages of baking. It was particularly unfortunate that serious deterioration of this type should have occurred at a time when abnormally high proportions of home-grown wheat were being compulsorily employed in the grist.

If badly sprouted wheat is used in a bread-making grist, much of the resultant bread will be wasted, and this will entail a loss not only of the sprouted wheat, but also of the sound wheat in the blend. The Ministry of Food therefore wisely decided to permit seriously sprouted home-grown wheat to be used for feeding livestock, for which purpose it was quite suitable. This decision raised the question of what standard should be adopted for the differentiation of usable wheat from wheat which it would be unwise to employ in the bread-making grist. In other words, at what stage of sprouting should wheat be regarded as unfit for milling? The most obvious solution, of course, was to fix a limit for the alpha-amylase activity of the wheat, but unfortunately the technique by means of which this can be determined is such that the adoption of such a standard would have restricted the number of samples capable of being evaluated daily by any one operator to very few. It so happens, however, that in the majority of instances the beta-amylase activity of wheat runs parallel to the alpha-amylase activity, and the more or less standard method of determining the former property—the so-called maltose test which is well known and understood throughout the milling industry—enables something like forty samples to be tested daily by one operator. The Ministry of Food therefore issued instructions that the suitability of sprouted home-grown wheat for bread-making purposes was to be judged by its beta-amylase activity as revealed by the empirically determined "maltose figure"; wheats which gave a maltose figure above a specified limit could be classed as "unmillable." Had not this special dispensation been granted by the Ministry of Food, it is certain that a vast quantity of flour would have been wasted because its bread-making quality had been ruined by an excessive alpha-amylase activity. Even so, a significant proportion of the flour in certain districts possessed a dangerously high maltose figure, and serious trouble in the bakery was averted only by the application of special measures by the miller and baker.

The miller was able to effect some degree of alleviation of the detrimental effect of sprouted wheat in the blend by raising his level of chemical treatment, thereby increasing the stability and toughness of the gluten. Light grinding was also helpful in that it avoided the susceptibility of the starch to enzymic attack being unduly increased by damage sustained during the milling process. The remedial measures available to the baker were the use of a cool, short-process dough containing liberal salt and yeast, followed by a thorough baking out in a moderate oven without the use of steam. The use of malt preparations as dough ingredients would, of course, only aggravate the trouble, and bakers were warned by the Ministry of Food to dispense with these temporarily. The prompt and effective measures taken by the Ministry of Food, the millers and the bakers, and their scientific advisers to deal with a serious situation are deserving of the highest praise, since they enabled a potentially dangerous wheat crop to be dealt with in such a way that no significant proportion of the nation's bread underwent a serious deterioration in quality.

Maintenance of Bread Quality

An important proportion of our daily requirements of calories and of protein is obtained in the form of bread, and it is important, therefore, that this article of food should maintain a high standard of attractiveness and palatability. Particularly is this so at the present time, when some of the disadvantages of our necessarily restricted diet can be offset by an increased consumption of bread, which remains unrationed. The miller made his contribution towards a high standard of quality in our war-time bread by perfecting a method of obtaining a flour rather than a meal at 85 per cent. extraction, but the last word lies with the baker. The Ministry of Food have realised that, if the baker is not to be handicapped in his share of the task, he must be kept informed of the nature of the flour with which he has to deal. They have therefore issued periodically through the bakery journals notices of the nature of the grist from which current flour is being produced, so that the baker has been aware of any changes which might call for some modification of his process. Through the same channels they have also kept the baker informed of any unusual features in the flour, such as a high maltose figure, and have suggested precautionary measures which might with advantage be adopted.

Another step taken by the Ministry of Food to assist in the maintenance of a good standard of bread was the appointment of a panel of practical bread advisers. Their function was to assist bakers who experienced any difficulty in producing a good loaf, and such bakers were encouraged to seek the help of these experts. The Ministry also arranged that samples of commercial bread should be purchased weekly and forwarded to the Cereals Research Station for evaluation. Any samples which proved to be of inferior quality were followed by an early visit to the bakery concerned by the adviser for that area.

Alteration in Flour Extraction

The rate of extraction of National flour and also of "M" flour—*i.e.*, flour intended for purposes other than bread-making—was lowered on October 1, 1944, from 85 to 82½ per cent. Millers were required, however, to continue to include in the flour the maximum quantity of germ possible on their milling systems so that, despite the reduction in the extraction, the vitamin B_1 content of National flour should be maintained. This drop in the extraction resulted in a whiter flour and bread, although the whiteness and flouriness of the previous 85 per cent. product had become amazingly good for such an extraction. The greater attractiveness in colour of the 82½ per cent. flour was obtained, moreover, without a significant decrease in nutritive value. The best 82½ per cent. flours showed ash contents of 0·85 per cent. or less (with creta present) and fibre contents of 0·25 per cent. or less, and yet exhibited B_1 contents of at least 0·90 I.U. per gram. The colour of such flours was almost unbelievably good for an extraction significantly above 80 per cent., but it was, of course, still considerably inferior to that of pre-war white flour of 72 per cent. extraction. There is, however, little point in presenting a detailed comparison of 85 per cent. and 82½ per cent. flour, since the latter extraction was in operation for only three months; at the beginning of 1945 the extraction was lowered to 80 per cent.

Milling for Vitamins

It has been established that the richest site of vitamin B_1 in the wheat grain is the scutellum and not, as was at one time thought, the embryo; the former contains 60 to 70 per cent. of the total B_1 of the grain, whereas the B_1 content of the latter represents only about 3 per cent. of the total. It follows, therefore, that the maintenance of a high B_1 content in flour demands that the milling process shall be performed in such a manner that the scutellum fraction of the germ is retained in the flour streams instead of passing to the offal sack. The modifications which millers introduced into the milling system in order to improve the colour and "flouriness" of the 85 per cent. product without significant loss of B_1 enabled this to be done, although millers were unaware at the time that they were in effect attempting to mill for scutellum. This particular problem was, in fact, solved by the practical skill and experience of the miller before it had been formulated by the scientist. As the extraction falls, however, it becomes progressively more difficult to exclude the bran and at the same time to retain the scutellum, and hence, when the extraction was lowered to 82½ per cent. and a further decrease seemed likely, the Cereals Division of the Ministry of Food saw fit to issue a pamphlet upon the subject. This pamphlet, which appeared in October, 1944, contained some useful and very interesting analytical data, but it contributed little that was new to our knowledge of the technology of milling for high vitamin content. The final recommendations in the pamphlet were essentially a summary of the modifications which millers had introduced as a result of the 85 per cent. extraction Order and which had since become more or less generally adopted throughout the industry.

There is every likelihood that, at least in the immediate post-war period, the necessity for flour to conform to a stated nutritional standard will be continued. If this should be so, shall we be obliged to have a near-white flour milled to contain a high proportion of scutellum, or shall we be able to enjoy a pre-war white flour enriched with the necessary addenda? Arguments may be adduced for and against each policy, but a discussion on this subject, although both interesting and important, does not fall within the scope of

this article. The matter will, however, doubtlessly receive early and full consideration by the milling industry.

Standard for Self-Raising Flour

Early in 1944 an Order (S.R. & O. 1944, No. 44) came into force which required that all self-raising flours should comply with a stated specification for aerating power. This Order was of direct concern to the milling industry, since many flour millers are also manufacturers of self-raising flour. By the terms of this Order a self-raising flour was required to yield not more than 0·65 per cent. total carbon dioxide and not less than 0·45 per cent. available carbon dioxide, a specification which in effect set an upper and a lower limit for the bicarbonate content of the mixture and also necessitated that the acid body was present in sufficient proportion to render available at least 70 per cent. of the total carbon dioxide. It was realised that the presence of creta in the flour presented a difficulty, inasmuch as it would influence the figure for the total carbon dioxide, but would have an unpredictable effect because of unavoidable variations in the amount present. The Ministry of Food therefore granted permission for creta to be omitted from self-raising flours.

As the Order stands at present there is insufficient safeguard for the honest self-raising flour manufacturer who is employing a satisfactory formula and a normal manufacturing technique. In the first place, the instructions for the performance of the residual CO_2 determination are much too vague and permit variations in technique which will give widely different results on the same sample.* Secondly, the manufacturer is afforded no protection against unavoidable irregularities in distribution. The manufacture of self-raising flour involves the distribution throughout flour of about only 2½ per cent. of mineral constituents possessing different physical properties from the flour. It is not to be expected, therefore, that even the intensive mixing procedure normally employed would always produce absolute homogeneity. In other words, although a batch mixing of self-raising flour may contain the correct proportions of the added ingredients, it does not follow that each 5-gram or 10-gram sample in that batch will also contain exactly the correct amount of bicarbonate and acid. Since the quality of self-raising flour taken for analysis is 10 grams or less, the result of a single determination is not necessarily representative of the composition of the bulk or even of the ¼ lb. to 1 lb. normally employed by the housewife.

* On page 133 of this issue an article by Thomas H. Fairbrother exhaustively discusses this matter, and describes methods of analysis giving concordant results.

Technological Training

A JOINT meeting of the London sections of the Royal Institute of Chemistry, the British Association of Chemists and the Association of Scientific Workers was held recently to discuss Chemical Education.

His views on the knowledge and skill expected from an analytical chemist were given by Dr. J. R. Nicholls. He stressed the need for training in fundamental chemistry and in the principles underlying the various analytical procedures; speed and accuracy were essential and keen powers of observation were required. Chemical education should include some account of the factors which determine whether a particular chemical reaction is suitable for use on a large scale and it was a matter for regret that there are no Chairs of Analytical Chemistry at the universities and no academic schools of research in analysis.

For a work's chemist too high a degree of specialisation in the Degree Course should be discouraged, was the opinion of Dr. F. W. Stoyle. At the same time, efforts should be made to give students an idea of the similarities and differences between laboratory and works practice by the resort to factory visits. After employment the graduate should supplement his academic training by courses in technology and ancillary subjects, such as costing, factory legislation, etc. He should attempt to improve factory technique while making due allowance for the craft of the operative.

Mr. F. A. Robinson spoke on "What is expected of the Research Chemist?" He was of the opinion that the primary requirement was a sound grasp of the principles of scientific research, and, secondly, an ability to apply these to whatever problems were encountered. He should be gifted with a healthy scepticism, inventiveness, patience, the ability to read intelligently and an interest in the utilitarian aspect of his work. The latter quality was perhaps most neglected in university training, and might be fostered by informing the student of technological as well as academic discoveries.

Dr. J. Kenyon, in speaking on university training, pointed out that chemistry was a wonderful blend of craft and science, and the training of a chemist was, therefore, twofold in character. In the laboratory the aim was to acquire manipulative skill and develop powers of observation and deduction; while in the lecture room the fundamental principles of the science were required. He stressed the importance of the latter and did not conceive it to be the function of university training to produce youthful specialists ready to fulfil the specific requirements of any particular industry. Rather was it to supply young men and women capable of applying the results of their training—a skilled hand, an observing eye, a well-stored mind, a critical judgment and a logical intellect—to meet the varied demands of the chemical industry.

Speaking on the technical training of the chemist, Dr. A. J. Jenkins affirmed that full-time day courses at a university or technical college were somewhat academic in character and that emphasis was rightly placed on principles rather than on applications. Greater co-operation was needed between the universities and technical colleges and more technical college courses should be regarded as adequate qualification for a Degree. He suggested that it would prove of immense value if there existed a faculty of technology and if the London University and a National Tech-

nological Institute were to grant Degrees and to co-ordinate and supervise technical training generally.

Dr. E. A. Rudge paid high tribute to the sterling qualities of the part-time graduate and expressed the opinion that he stood high in industrial value. Against the advantages he showed in training and experience were the serious disadvantages of narrowness in outlook, since he lacked the experience of academic life. He suggested that this could be overcome by wider provision for part-time day classes, which should be integrated where possible into the academic course.

The discussion which followed was summarised by Dr. C. G. Anderson. A number of contributors considered that, during the university chemical courses, a certain amount of technological training and some knowledge of standard forms of plant should be given so that graduates should not be completely at a loss on entering industry. It was thought that this training would be helped by interchange between industrial chemists and university teachers, by works visits and vacation employment in industry. Training in the use of literature was also considered desirable. Students should be given some idea of the conditions, requirements and possibilities in industry in order that they may select to some extent the type of work for which they are fitted. It was suggested that more attention should be paid to inculcating the scientific outlook quite early in ordinary school training. Part-time evening study, while valuable, was considered too strenuous, and more day training and State bursaries for full-time study were considered desirable. The opinion was expressed that there should be courses for the training of laboratory assistants and stewards, and that there was need for refresher courses in a variety of subjects; also that industry should provide special training, while apprenticeship schemes for juniors might prove of great advantage.

Citrus Fruit Juices Control

SATISFACTORY quantities of citrus fruit juices continued to reach this country during 1944.

The 1945 import programme has now been drawn up and the Advisory Committee are pleased to report that they have been able to arrange with the Ministry of Food for a substantial increase in percentage of orange juice in view of the very great increase in popularity of this variety. The trade will also learn with satisfaction that provision has been made for a substantial quantity of lime juice to be imported during 1945. It will be recalled that supplies of this variety have been practically non-existent during the past two years, as shipments have been confined to concentrated juices, and this variety is not procurable in that form.

As far as can be ascertained at present supplies by variety will be allocated in the following percentages:

Orange	48 per cent.
Lemon	29 ,, ,,
Lime	12 ,, ,,
Grapefruit	11 ,, ,,
	100 per cent.

These figures are intended to serve as a guide to allottees, but should be treated as a probable indication only. It will be appreciated that such unforeseen contingencies as possible crop failures, losses at sea, etc., might arise and result in actual arrivals differing from these estimates.

The particular attention of allottees is called to the fact that during the past three years substantial quantities of concentrated lemon and grapefruit juices have been imported from the U.S.A. by the Ministry of Food, who frequently held substantial stocks for considerable periods. In this way allottees have been enabled to purchase supplies of these varieties more or less on a hand to mouth basis. The 1945 import programme, however, does not provide for the importation of any juice from the U.S.A., and although the Ministry is still holding certain stocks of concentrated lemon juice, in general it will not be possible to depend on stocks being forthcoming from the Ministry at short notice. The bulk of the 1945 importations will be made through normal commercial channels, and it will be necessary for allottees, if their supply position is to be safeguarded, to hold more substantial stocks of juices than they have been in the habit of doing in the past. The non-availability of American juices will mean that increased supplies will be imported from other countries, and principally from those where the availability is confined to the early months of the year. While, therefore, the import programme provides for sufficient juice to cater for present-day requirements and leave manufacturers with about six months' stock at the end of the year, approximately two-thirds of the estimated arrivals are expected to reach this country in the first half of the year, and manufacturers should therefore be prepared to hold in stock at the end of June next approximately eight months' stock of juice.

Food Technology

THE first volume of this important work* was reviewed in FOOD MANUFACTURE, January, 1945. The second volume comprises Parts III to VI. Part III deals with Unit Operations and Processes, and covers the handling of raw materials and their grading, disintegration, separation, mixing and blending, heat treatment, dehydration, etc.

Part IV covers Sanitary and Quality Control in the U.S.A. Food machines are also discussed in this section, and simple equipment, power equipment and specific operations are described. Chapters on washing, detergents, sanitation, and insect control are also included.

The subject of food preservation occupies Part V, and in 165 pages a good attempt is made to summarise its principal aspects.

The sixth and final part deals with production of cereal grains, bread and bakery products, sugars and syrups, confectionery products, fruit juices, jams, jellies and preserves, milk and milk products, meat and meat products, oils and fats, beverages, alcoholic and non-alcoholic and industrial waters.

The index is good. The bibliography consists of notes at the foot of the pages and a list of books at the end of each chapter. As a broad survey of the whole subject of the chemistry and technology of food and food products the book can be recommended.

* *Chemistry and Technology of Food and Food Products*, by a group of specialists, under the editorship of Morris B. Jacobs, Ph.D., vol. ii. Pp. 890+xx. Individual vol., $10.50. Set of two volumes, $19.00.

The Weakening of Self-Raising Flour on Storage

This article has special reference to the Self-Raising Flour Standards Order, 1944 (S.R. & O. No. 44). The results are based mainly on the author's original work. The determination of carbon dioxide, which should be simple, is complicated in the case of self-raising flour by lumping and gelatinisation, which causes occlusion of carbon dioxide and a resultant low figure.

THOMAS H. FAIRBROTHER, M.Sc., F.R.I.C.

IN JANUARY, 1944, in exercise of the powers conferred upon him by Regulation 2 of the Defence (Sale of Food) Regulations, the Minister of Food set up Standards for Self-Raising Flour. The Schedule was as follows:

1. Self-raising flour shall yield not less than 0·45 per cent. of available carbon dioxide and not more than 0·65 per cent. of total carbon dioxide, the available carbon dioxide and the total carbon dioxide being determined in the manner specified in paragraph 2 of this Schedule.

2. (*a*) The total carbon dioxide shall be determined by ascertaining the weight thereof evolved when the self-raising flour is treated with excess of dilute sulphuric acid at room temperature, the evolution being completed either by boiling for five minutes or by means of reduced pressure.

(*b*) The available carbon dioxide shall be determined by ascertaining the difference between the total carbon dioxide and the residual carbon dioxide; and the residual carbon dioxide shall be determined in the following manner:

The self-raising flour shall be treated with water first for twenty minutes at room temperature, then for twenty minutes on a boiling water-bath, and subsequently by boiling for one minute. The residual carbon dioxide is the weight thereof evolved when the self-raising flour so treated is further treated with excess of dilute sulphuric acid at room temperature, the evolution being completed either by boiling for five minutes or by means of reduced pressure.

Incompatibility of Results

The author had considerable misgivings about the determination of total and residual carbon dioxide in self-raising flour among different analysts. The determination is complicated by the gelatinous nature of the flour/water suspension and the danger of occlusion of carbon dioxide. The determination had been carried out as a routine test in the laboratories of McDougalls Limited, for many years before standards for self-raising flours were thought of, and the thousands of tests carried out yearly had given evidence of the pitfalls. When the standards were published the author felt sure that widely varying results would be obtained, and in view of the high figure fixed for available carbon dioxide the possibility of unjustifiable prosecutions became evident. A sample of self-raising flour was, therefore, carefully mixed in a laboratory mixer containing 3 lb. 2 oz. sodium bicarbonate and 3 lb. 12 oz. acid calcium phosphate (80 per cent.) to 280 lb. flour. This was equivalent to 0·571 per cent. of total carbon dioxide. Samples were sent out to a number of well-known cereal chemists and also to the Government laboratory, and widely varying results were obtained, as is indicated in Table 1.

It was interesting to note that the average total carbon dioxide was 0·571 per cent. against the theoretical 0·571 per cent. Six analysts obtained higher results than this. The limits were—maximum 0·60 per cent., minimum 0·52 per cent.

The limits for available carbon dioxide were 0·535 per cent. maximum to 0·46 per cent. minimum, a difference of 0·075 per cent. This variation would obviously be very serious with flours of low bicarbonate content, and means that a flour would have to contain 0·525 per cent. available carbon dioxide to ensure that the minimum of 0·45 per cent. would be reported. It will be shown later that self-raising flours "run down" in storage, the amount of loss of carbon dioxide varying with the storage conditions.

Definition of Method

It became evident that the directions given in the schedule were not sufficiently detailed to ensure uniformity, and the method should state definitely—

(*a*) Amount of water.
(*b*) Amount of flour.
(*c*) Type of stirring or rotation.
(*d*) Method of addition of flour to water.
(*e*) Period of final boiling.

TABLE 1

Laboratory No.	*Total CO_2. Per Cent.*	*Available CO_2. Per Cent.*	*Residual CO_2. Per Cent.*	*Method.*
1.	0·60	0·53	0·07	Not stated
2.	0·58, 0·62, 0·60, 0·60 (0·60)	0·52	0·08	Not stated
3	0·591	0·53?	0·058	Green's method for creta (Analyst)
4	0·60, 0·58 (0·59)	0·55	0·04, 0·04	Not stated
5.	0·585	0·515	0·07	Volumetric (Chittick)
6.	0·585	0·49	0·095	Not stated
7.	0·568	0·535	0·033	Gravimetric by absorption in soda-lime
8.	0·56, 0·57	0·485, 0·46	0·075, 0·110	Not stated
9	0·55, 0·54, 0·52 (0·54)	0·51, 0·49, 0·48	0·04, 0·05, 0·04	Chittick (A.A.O.C.C.)
Averages:	0·571	0·508	0·063	

Obviously the high figure of 0·11 residual carbon dioxide obtained by one chemist was due to occluded carbon dioxide, probably caused by lumping or gelatinisation.

Toward the end of 1944 the expected complications occurred and proceedings were threatened on account of self-raising flour containing less than 0·45 per cent. available carbon dioxide. A public analyst reported the figures:

Total carbon dioxide	0·52 per cent.
Residual carbon dioxide ..	0·16 ,, ,,
Available carbon dioxide ..	0·36 ,, ,,

The author obtained the following figures on the duplicate sample:

Total carbon dioxide	0·51 per cent.
Residual carbon dioxide ..	0·035 ,, ,,
Available carbon dioxide ..	0·475 ,, ,,

Another cereal chemist found no residual carbon dioxide at all.

In order to find the limits, the author obtained six samples of commercial self-raising flour from shops in the town where the proceedings were threatened. These were analysed in three different cereal laboratories, with the results shown in Table 2.

In view of these facts it has been deemed advisable to set out in detail the methods which have been used in McDougalls' laboratories over a number of years.

DETERMINATION OF CARBON DIOXIDE IN SELF-RAISING FLOUR

1. Total Carbon Dioxide

There are three methods—(*a*) gravimetric, (*b*) gasometric, and (*c*) volumetric.

The first is a very lengthy process, the second and third are much more rapid and just as accurate.

(*a*) *Gravimetric Method* (see Fig. 1).

Apparatus.—The reaction vessel is a wide-necked 500 ml. round bottom flask to which is fitted a three-holed rubber stopper. A bent glass tube through one hole reaches almost to the bottom of the flask, and the other end is connected by means of a rubber joint to a tower of stick potash. A second hole carries a dropping funnel and the third a small Jackson double-walled condenser. The outlet tube of the latter is connected by a rubber joint to a small sulphuric acid bubbler (inlet tube about ¼ inch below the surface) leading to a U-tube containing broken pumice, saturated with concentrated sulphuric acid and then practically drained. This leads to the two soda-lime calcium chloride absorption U-tubes and to a guard-tube containing calcium chloride and soda-lime, and having a tap-stopper connected with a side tube which is attached by another rubber joint to a 5-litre aspirator.

The two soda-lime U-tubes are of a convenient

TABLE 2

Brand.	1. CO_2		2. CO_2		3. CO_2		4. CO_2		5. CO_2		6. CO_2	
	Total.	*Available.*	*Total.*	*Available.*	*Total.*	*Available.*	*Total.*	*Available.*	*Total.*	*Available.*	*Total.*	*Available.*
Lab. A. ..	0·48	0·48	0·46	0·46	0·49	0·47	0·48	0·47	0·58	0·56	0·35	0·35
Lab. B. ..	0·51	0·47	0·50	0·46	0·51	0·48	0·50	0·46	0·63	0·58	0·44	0·40
Lab. C. ..	0·55	0·50	0·49	0·45	0·53	0·46	0·50	0·48	0·62	0·58	0·43	0·40
Average ..	0·51	0·48	0·48	0·46	0·51	0·47	0·49	0·47	0·61	0·57	0·41	0·38

size for weighing. The first is glass stoppered, and the limb on the sulphuric acid side is filled with soda-lime, but containing a little calcium chloride at the end where the air current enters; half the second limb is filled with soda-lime, and then half with calcium chloride where the air leaves the tube. The second U-tube is filled one half with soda-lime and the other half with calcium chloride where the air current leaves. This U-tube has rubber stoppers (it could be replaced by a glass-stoppered one), and when weighed the side tubes are closed with short pieces of rubber tubing and little plugs of glass rod.

The guard-tube serves to prevent any moisture or carbon dioxide from the aspirator being absorbed by the U-tubes.

Loose plugs of cotton-wool are inserted in the U-tubes to prevent solid particles from entering the side tubes. Glass-wool is used for the sulphuric acid tube. Soft rubber joints for connection are used to avoid strain on the U-tubes. The U-tubes and guard-tubes are suspended by means of thin wire hooks to a glass rod supported by a clamp on a retort stand.

Materials and Reagents

1. Soda-lime—B.D.H. "Carbosorb" about 8-10 mesh.
2. Calcium chloride—B.D.H. fused granular 10-14 mesh.
3. Sulphuric acid—B.D.H. analar, sp. gr. 1·84, (*a*) for pumice, (*b*) 25 per cent. w/v for reaction with self-raising flour.
4. Potassium hydroxide—B.D.H. sticks.
5. Pumice—ordinary large pumice broken down into smaller pieces.
6. Cetyl alcohol—B.D.H. (a small piece of this is introduced into the reaction flask, as it prevents frothing).

Procedure.—The reaction flask and the parts leading to and from it must be perfectly dry before starting the determination. Introduce 10 gm. of the flour for examination into the reaction flask and add a small piece of cetyl alcohol and two small granules of pumice. Attach to the rubber bung and support the flask on a tripod and asbestos gauze by means of a clamp and retort stand. Remove the condenser inlet and outlet tubes, as they are not required until later. Air is aspirated through the apparatus at such a speed that the bubbles can be counted easily; about two bubbles per second is recommended. Test the joints of apparatus by turning on the aspirator with the air inlet on the potash tower closed, when bubbling should soon cease. If the apparatus is airtight the estimation may be proceeded with.

With the air inlet open, aspirate about 2 litres of air through to wash out the small amount of carbon dioxide in the apparatus. Screw down the clip between the sulphuric acid U-tube and the first soda-lime tube; turn off the tap in the guard-tube; seal off the two soda-lime U-tubes and remove for weighing, at the same time detaching the guard-tube from the aspirator. Allow the U-tubes to

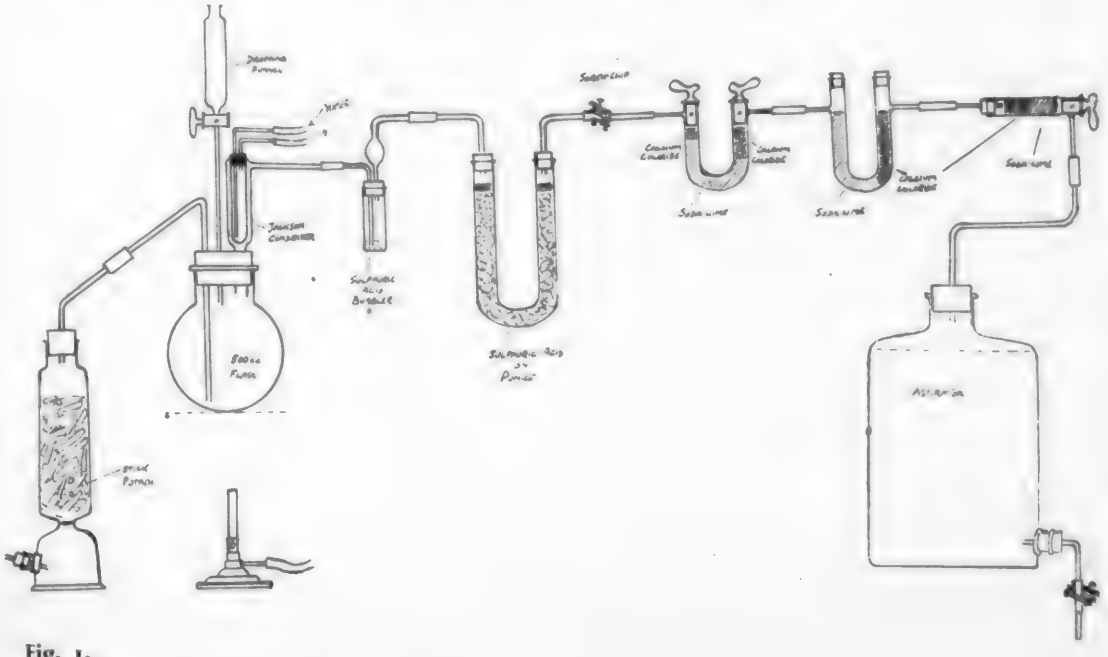


Fig. 1.

attain the temperature of the balance case, open them for a moment, close again and weigh. Replace them in the absorption train and open the screw clip; open the guard-tube to the aspirator and aspirate another 2 litres of air through the apparatus. Remove the U-tubes as before and reweigh; they should then be constant in weight.

Introduce 50 ml. of 25 per cent. sulphuric acid into the dropping funnel. Replace the U-tubes in the absorption train and begin to aspirate slowly again. Run in the acid carefully so as not to increase materially the rate of bubbling. Turn off the tap on the dropping funnel as the last drops of acid are run in. Detach the flask from the clamp and shake carefully, but fairly vigorously, so as to ensure a thorough admixture of the flour and acid, otherwise the flour cakes on the side of the flask. This is quite practicable providing the rubber joints are made fairly flexible. The flask is then replaced in its clamp, the condenser tubes are inserted, and a good flow of water passed through the Jackson condenser.

The contents of the reaction flask must now be heated to drive off all the carbon dioxide, which is then absorbed in the two soda-lime tubes.

Heat the flask very gently at first, adjusting the aspirator to allow the bubbling to proceed slowly. Slight charring takes place, but this does not affect the estimation. Heat the contents of the flask to boiling; be careful to adjust aspiration so that there is no back pressure into the glass tube leading from the bottom of the reaction flask to the potash tower. Condensation will take place on the inner wall of the condenser; continue boiling for about three minutes after the first drops of water form; then remove the flame and allow the apparatus to cool, with the aspirator drawing air at the rate of about two bubbles per second. In order to ensure the passage of all the carbon dioxide into the absorption tubes, a volume of air equal to about six times the capacity of the flask should be drawn through; about 4 litres is sufficient.

The U-tubes are removed, stoppered and placed in the balance case to be reweighed. The increase in the combined weight of the two U-tubes × 10 gives the percentage of total carbon dioxide in the sample.

(*b*) *Gasometric Method* (see Fig. 2).

This is the method which has been used satisfactorily for many years in the author's laboratory. It is a modification of the well-known Chittick method recommended by the American Association of Cereal Chemists.

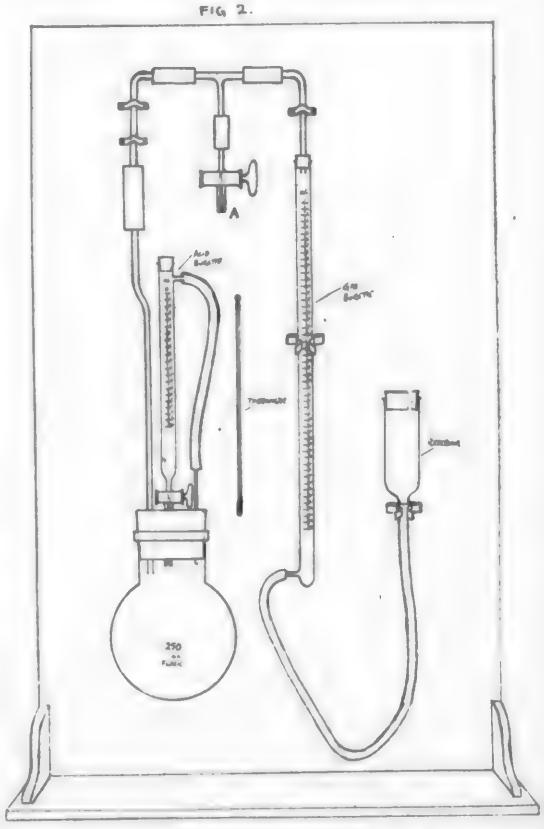
Apparatus.—A glass T-piece is connected by means of rubber pressure tubing at one end of its horizontal part to a glass bend, which, in turn, is connected by means of thick pressure tubing about 3 inches long to a glass tube (18 inches long). This passes through one hole of a rubber bung (1½ inches at its narrow end); this has three holes bored through it, symmetrically placed, to take in addition a burette (capacity about 25 c.c.) graduated downwards from 0 to 20 ml. along part of its length, and having a short length of capillary tubing below the tap sufficient to pass through a rubber bung. At the top of the burette there is a short side-arm which is connected by narrow pressure tubing to a short piece of narrow bore glass tubing passing through the third hole of the rubber bung. The burette is fitted with a small rubber stopper.

The vertical part of the T-piece is connected to a glass tap by a rubber joint of pressure tubing.

The other end is connected by pressure tubing to a glass bend and then to a 50 ml. gas burette (adapted for the purpose from a side-arm burette with its tap drawn off and glass sealed). A long piece of ordinary rubber tubing connects this to a glass reservoir (this can be conveniently made of any suitable vessel—in our case a Bolton-Revis thimble extractor serves the purpose admirably). This contains the displacement solution, and is, therefore, partially stoppered with a perforated rubber bung which prevents excessive evaporation.

The whole is fixed to a strong backboard with small brackets and spring clips, and, this, in turn,

FIG. 2.



is screwed firmly to the work bench on a baseboard.

A thermometer pinned to the board gives the temperature reading for each determination.

A 250-ml. wide-mouthed, bolthead flask of Monax or other resistant glass is used for the decomposition of the self-raising flour, and when in use is attached to the three-holed rubber bung.

The displacement solution used is 5 per cent. sodium sulphate solution with 2 ml. methyl orange and a few drops of sulphuric acid added to give it a deep pink colour. This is allowed to stand in the air for some time to pick up carbon dioxide, and one or two preliminary determinations are sufficient to ensure that no error is caused by some of the carbon dioxide evolved being absorbed by this solution in later estimations. This solution seldom needs replacement.

The acid used to decompose the soda in the flour is 25 per cent. w/v sulphuric acid, and it is kept in a bottle alongside the apparatus, so that it is always at the same temperature as the gas-measuring apparatus.

Procedure.—Weigh 10 g. of the self-raising flour into a reaction flask, which is dry and at the same temperature as the rest of the apparatus. Attach it firmly to the rubber bung so that it does not slip subsequently. By means of a small funnel, fill up the acid burette to the zero mark and insert the rubber stopper. Open the tap at A to the atmosphere, then raise the levelling tube until the adjacent liquid menisci are exactly level, and close the tap again (by this time the temperature and pressure within the apparatus will be the same as those in the room). Lower the reservoir to the clip supporting it. Run 20 ml. of acid into the reaction flask and turn off the stopcock. Hold the flask by the rim and rubber stopper and shake carefully to obtain thorough admixture of flour and acid (it is an advantage to have the long glass tube slightly bent outwards so that the flask can be shaken more easily). Then continue shaking, with a vigorous, almost semicircular movement, until the level of the solution in the gas burette becomes steady. Level off again by bringing to equilibrium and take the reading measured in ml. on the gas burette. Note the temperature on the thermometer attached to the apparatus and take the barometric pressure reading. From a table of aqueous vapour pressures find the corresponding vapour pressure at the temperature of the experiment and subtract this from the prevailing atmospheric pressure for calculating the volume back to standard temperature and pressure. Owing to the fact that when the acid is run into the flask it is replaced by an equivalent volume of air, the volume of gas measured off in the gas burette gives directly the volume of CO_2 actually released, and any reading error on the acid burette is of no consequence.

The formula used for calculating the volume back 0° C. and 760 mm. pressure is:

$$V_{NTP} = V_t \times \frac{273}{760} \times \frac{P - p}{273 + t} = V_t \times 0{\cdot}359 \times \frac{P - p}{273 + t}$$

where V_t equals burette reading,

P ,, barometric pressure,

p ,, aqueous vapour pressure,

t ,, temperature in degrees centigrade.

This formula is not strictly correct as applied to carbon dioxide, but it is sufficiently accurate for routine purposes, and the results obtained are very close to the figures obtained from the gravimetric determination. (The determination is best carried out in a room of even temperature and well away from draughts.)

This method has been used over a period of many years, and the results have been found to be most consistent at temperatures between 15° C. and 25° C. The determinations can be carried out very rapidly, and by making use of the slide rule much laborious calculation can be saved.

(*c*) *Volumetric Method.*

The author has had no personal experience with this method. The following details have been kindly supplied by Dr. D. W. Kent-Jones, of the Dover Laboratories, who uses it. On numerous interchange samples, Dr. Kent-Jones' results have agreed very closely with those obtained by the author's modified Chittick method.

The principle of the method is the removal of the evolved carbon dioxide by means of a current of carbon-dioxide-free air and the passage of the gaseous mixture through a long column of glass beads wetted with a measured volume of standard baryta solution.

The receptacle in which the carbon dioxide is evolved from the material under test (the self-raising flour as received or after the treatment laid down in the Order for the determination of the residual carbon dioxide) is a 500-ml. bolt head flask. The rubber stopper which fits this carries an exit tube, a tap funnel for adding the acid, and an inlet for carbon-dioxide-free air. The exit tube is connected via a steam trap to a 500-ml. Buchner flask, which carries a wide glass tube packed with glass beads. This glass tube, which is 1 inch in diameter and 24-30 inches in length, is fitted to the Buchner flask by a rubber stopper and reaches to the bottom of the flask. When the material under test has been added to the reaction flask, the current of carbon-dioxide-free air is started and allowed to continue until all the atmospheric carbon dioxide has been swept out of the system; 50 ml. of approximately N/5 baryta are then run into the bead tube and the current of carbon-dioxide-free air is recommenced and continued for the duration of the test. The next step is to set free the carbon dioxide from the material in the flask. In the determination of total carbon dioxide this is accomplished by adding to the reaction vessel via

the tap funnel 100 ml. carbon-dioxide-free water followed by 20 ml. 1:1 sulphuric acid. The water is added slowly and the flask vigorously rotated during the addition in order to yield a suspension free from lumps. In the determination of residual carbon dioxide, the water is omitted and 20 ml. 1:1 sulphuric acid only are run into the flask. The reaction flask is then heated until the contents boil and the boiling continued for five minutes. The flame is then removed and the current of carbon-dioxide-free air allowed to continue for a further fifteen minutes, being increased in velocity for the final five minutes. The bead tube is then disconnected, the beads washed down into the Buchner flask, and the baryta titrated with N/5 hydrochloric acid.

The determination of total carbon dioxide is made upon 10 g. of the self-raising flour. Ten g. are also used for the determination of the residual carbon dioxide, but the material has to be treated as required by S.R. & O., 1944, No. 44, before being placed in the reaction flask. The 10 g. of flour are mixed into a smooth cream with about 15 ml. of water, and this is then diluted with a further 200 ml. of water. This suspension is then subjected to the conditions laid down in the Order and the resultant gelatinous liquor is placed in the reaction flask.

Residual Carbon Dioxide

Apparently the test which causes most of the trouble is the residual carbon dioxide, and, in the author's view, this is entirely due to the method.

Owing to the danger of lumping or gelatinisation, with resulting occlusion, the technique employed is most important.

The ratio of flour to water should be at least 1 to 20, and the author uses 5 g. per 100 ml. carbon-dioxide-free water.

The flour should be added to the water and not the water to the flour.

The flask should be immersed up to the neck in a boiling water-bath protected by rings and shaken vigorously at regular intervals. It is not sufficient to heat it *on* a water-bath.

After twenty minutes in the boiling water-bath the flask should be transferred to a pre-heated, double asbestos gauze, brought rapidly to the boil, and kept vigorously boiling for three minutes, care being taken to avoid charring.

After this procedure the residual carbon dioxide is determined either gravimetrically or gasometrically, as in the case of total carbon dioxide.

The Weakening of Self-Raising Flour in Storage

In considering the question of available carbon dioxide in self-raising flour, it must be borne in mind that the determination is made on a sample as purchased at a grocer's shop and not as manufactured in the factory. As is well known, the most used acid ingredient is acid calcium phosphate, and the reaction between this acid and bicarbonate of soda is not inconsiderable at room temperatures, and the reaction increases rapidly with increasing moisture content and rising temperatures. It is also to be remembered that self-raising flour is packed in small linen or paper bags, and the usual mode of distribution is as follows: manufacturer→wholesaler→retail grocer→housewife. It is quite possible for several months to elapse between the times of manufacture and its arrival in the hands of the housewife. It may have been stored in a damp warehouse or exposed in a sunny shop window, and in such circumstances there is bound to be a considerable fall in total and available carbon dioxide.

Testing Extent of Deterioration

To investigate the extent of this falling-off, samples of self-raising flour in three types of package were exposed in a humidity cabinet with humidities maintained between 70 and 100 per cent. and temperatures between 50° and 85° F. The packages were (1) Ordinary paper bag stuck with gum, (2) Cellophane bag stuck with "Gloy," (3) Cellophane bag stuck with gum.

TABLE 3

	At November 1, 1944.			*At February 1, 1945.*		
	Total CO_2.	*Residual CO_2.*	*Available CO_2.*	*Total CO_2.*	*Residual CO_2.*	*Available CO_2.*
Cellophane gummed	0·548	0·040	0·508	0·380	0·043	0·337
Cellophane Gloy	0·550	0·040	0·510	0·398	0·047	0·351
Paper gummed	0·574	0·045	0·529	0·390	0·050	0·340

TABLE 4

	At November 1, 1944.			*At February 1, 1945.*		
	Total CO_2.	*Residual CO_2.*	*Available CO_2.*	*Total CO_2.*	*Residual CO_2.*	*Available CO_2.*
Cellophane gummed	0·548	0·040	0·508	0·512	0·038	0·474
Cellophane Gloy	0·550	0·040	0·510	0·530	0·038	0·492
Paper gummed	0·574	0·045	0·529	0·536	0·044	0·492

Determination of total, residual and available carbon dioxide were carried out at the beginning of the test and after three months' storage.

In addition to this, test bags of each kind were packed in commercial cardboard containers and exposed in the laboratory storeroom.

In the humidity cabinet there was a substantial increase in moisture content:

Cellophane gummed	..	13·0 to 16·1 per cent.
Cellophane Gloy	..	12·8 to 15·2 ,, ,,
Paper gummed	..	13·3 to 15·6 ,, ,,

and, as would be expected, there was a considerable drop in carbon dioxide content, as shown in Table 3.

On account of this interaction each sample which initially was completely within the limits set up in the Standards Order fell lamentably below the limit of 0·45 per cent. available carbon dioxide after three months' storage under hot, moist atmospheric conditions.

The losses in the case of the cartons in the laboratory storeroom were not so great, but quite considerable, and approached very nearly the limiting amount, as in Table 4.

Summary and Conclusions

Great care is required in the determination of total and residual carbon dioxide in self-raising flour, and to obtain comparable results in different laboratories an absolutely standard method should be employed, particularly in regard to residual carbon dioxide.

It is quite possible for self-raising flour to lose enough gas through natural causes to bring it below the limit for available carbon dioxide but without affecting adversely the baking value, and in the author's opinion the figure of 0·45 per cent. is unreasonably high. It might be argued that to allow for possible losses in storage more ingredients should be used, but, in practice, ingredients which would allow for more than 0·60 per cent. total carbon dioxide would impart an unsatisfactory flavour to the baked goods.

The writer acknowledges the assistance and co-operation of Mr. E. Seal, M.Sc., A.R.I.C., who has carried out much of the experimental work and prepared the diagrams, and thanks McDougalls, Limited, for permission to publish the results.

Meats from Australia

THE production of food on both domestic and exporting account is to be increased in Australia as far as possible under the influence of climatic conditions. The arrangements made with the British Government for the purchase of Australian meat for a four-year term ending in 1948 has given the greatest satisfaction. The period covered is from October 1, 1944, to September 30, 1948, and for dairy produce from July 1, 1944, to June 30, 1948. The British Government is anxious for Australia to maintain and possibly increase the production of meat and dairy products, and the Commonwealth intends to send surplus products to the United Kingdom after provision has been made for the following:

(1) Domestic requirements, including the Australian Services.
(2) Supplies for Allied Forces based on Australia.
(3) The quantity which the Australian Government might provide for relief purposes after consultation and agreement with the British Government.
(4) The quantities which the two Governments have mutually agreed should be supplied to other markets.

This agreement means that Australia has an assured market for four years for meat and dairy products. Surplus production of all classes of meat, including beef, mutton, lamb, pig meats and offals, is covered by this agreement; but before the beginning of the last two years of this arrangement the position of pig meat will be reviewed in order to determine the maximum quantities which Britain will take during those years.

Arrangements have also been made for the resumption of the chilled beef trade when the shipping position permits, while exports of canned meats will be the subject of annual negotiations. General terms and conditions of the agreement for carcase meat, with particular reference to prices, may be reviewed at the end of two years at the request of either Government, on the ground of substantial alterations in conditions.

It is anticipated that the prices at present paid for various kinds of meat for export under the Commonwealth Meat Purchase Plan will be maintained. Although slightly higher prices may be paid by the Commonwealth Government for mutton and offals of all classes, it is not likely that there will be any change in prices now being paid for beef, lamb and pig meats.

The British Ministry of Food also undertakes to buy all of Australia's exportable surplus of eggs, in powder or shell, for the seasons 1944-45 and 1945-46, and a quantity not exceeding 1,000,000 cases of eggs in shell, or the equivalent in egg-powder, for the season 1946-47. The purchase of the Australian egg surplus in 1947-48 is to be considered again in December, 1946.

The position in regard to dairy products has not been favourable recently in Australia. In 1938-39 the production of milk was 1,189 million gallons, of which 925 million gallons were used to produce butter, 65 million gallons to produce cheese, 36 million gallons for condensed and dried milk and 163 million gallons for consumption in the liquid form.

In 1943-44 the total production of milk was 1,052 million gallons, of which 716 million were used to produce butter, 78 million for cheese, 63 million for condensed and powdered milk and 195 million in the liquid form.

The principal factor in the decrease of production has been shortage of labour. However, increased consumption of liquid milk and greater production of cheese and powdered and condensed milk required by the fighting Forces have contributed to the decline in butter. It is estimated that butter in 1944-45 will amount to about 145,000 tons compared with 203,000 in 1938-39.

Impregnated Wraps for Fruit

R. G. TOMKINS, M.A., Ph.D.

Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge and Department of Scientific and Industrial Research.

AN ACCOUNT of the use of iodised wraps was first published in 1934.[1] In that article it was explained that losses from rotting of fruit held in storage—even in cold storage—might, in some instances, be so serious that positive measures for reducing them were desirable. After the known methods for reducing fungal rotting had been reviewed—*e.g.*, the use of fungicidal dips and the addition to the atmosphere of small amounts of such gases as sulphur dioxide, acetaldehyde, or ammonia—it was concluded that, provided the right substance could be found, wraps treated with a slightly volatile fungicide offered the simplest practical method of reducing rotting. The difficulties of finding such a substance were realised. It was pointed out that suitable substances would need to inhibit the growth of fungi, to be slightly but not too volatile, and should not cause damage to the fruit or taint it in any way, or render it toxic to human beings. Evidence was presented that iodine appeared to fulfil most of these conditions. In laboratory experiments some fruits, notably grapes and tomatoes, when wrapped in papers impregnated with iodine in potassium iodide, were attacked by moulds less rapidly than when wrapped in plain paper. Iodised wraps were, however, not suitable for all fruit, since some fruits—apples and plums—were damaged when wrapped in them.

Commercial Tests

Iodised wraps were tested under commercial conditions and good results, so far as reduction in rotting was concerned, were obtained with grapes shipped from South Africa.[2] However, the wraps were somewhat unsightly in colour and the wood wool used in packing was stained yellow. There was also the question whether the use of iodised wraps did not contravene the Public Health (Preservatives in Food) Regulations. Further, though wraps could be prepared easily enough in the laboratory by impregnating the wraps with iodine and potassium iodide in alcoholic solutions and allowing the alcohol to evaporate, large-scale manufacture proved more difficult. Nevertheless, the results obtained with iodised wraps had proved quite conclusively that the idea of making impregnated wraps was not of purely theoretical interest but could be translated into practice. It was also shown that eggs stored in iodised flats and fillers could be kept free from superficial moulds and that the principle of control of moulds by slightly volatile compounds could be applied not only to fruit but to eggs.

The Search for Suitable Compounds

Search for other suitable compounds was continued. There is unfortunately no way of knowing what substances are suitable except by trial. Some consideration of molecular weight, boiling point and melting point can help in a preliminary selection, and if one substance appears to fulfil some of the requirements, closely related compounds can be tested. It is easy to test whether a substance is volatile and fungicidal by placing small amounts of it in a closed container together with Petri dishes inoculated with suitable fungi and noting whether growth is reduced or inhibited. It is also easy to discover whether the substance causes damage or taint by wrapping fruit (or eggs) in wraps impregnated with it. Substances which inhibit fungal growth and do not damage fruit can then be tested further.

Rotting of citrus fruits due to green mould is a serious disease in commerce, and most of the tests so far undertaken in the laboratory have been with oranges. Of the many substances tested two only, diphenyl and o-phenyl-phenol,[3, 4] have so far proved at all successful. Diphenyl was found to reduce rotting by green mould without causing visible damage or taint to oranges and, when diphenyl-treated wraps were tested in Palestine and in shipment from Palestine to England,[5, 6] they were found to reduce rotting most effectively. Unfortunately diphenyl has a very characteristic odour which is disliked by some people and which is taken up in very small quantities by the skins of citrus fruit, although it is not absorbed by the flesh. Moreover, with grapes, diphenyl causes an undesirable taint; hence whatever future use may be made of diphenyl wraps with citrus fruits they are by no means generally applicable.

Effects of o-Phenyl-phenol

When wraps impregnated with o-phenyl-phenol alone were used with oranges and other fruits there was damage. This was overcome in laboratory tests in England by first dissolving the o-phenyl-phenol in liquid paraffin[4] and impregnating the paper with this solution, or by using a mixture of o-phenyl-phenol and hexamine.[7] In Palestine and South Africa both of these mixtures were less satis-

factory and caused damage to oranges, but partial success was achieved with lemons in South Africa with wraps impregnated with vegetable oil in which o-phenyl-phenol had been dissolved.[8, 9] Flats and fillers impregnated with o-phenyl-phenol were found in the laboratory to preserve eggs free from moulds. More recently in America, flats and fillers impregnated with pentachlorophenol have been used to reduce mouldiness and rotting of eggs.[10]

The present status of impregnated wraps, therefore, is this: it has been demonstrated quite clearly by laboratory and commercial trials that the use of wraps impregnated with certain volatile fungicides will reduce the extent of rotting of certain fruits held in storage without causing visible damage or taint, and that the rotting of eggs can be reduced by the storage of eggs in flats and fillers impregnated with certain volatiles. None of the substances so far found to work is ideal in every respect, and it is probable that at this stage their use might contravene the food regulations of this and other countries. However, there is hope that some day a substance will be found to the use of which no objection can be made, and if this hope were realised it would undoubtedly constitute a great practical advance.

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CORRESPONDENCE

Food Legislation and the Food Industry

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—The food industry has during this war suffered more than most other industries through concentration and restrictive legislation which have seriously curtailed new developments.

Just at a time when people are hoping for more varied foods and some alleviation of the drab wartime diet, a serious bar is raised to the enterprising food manufacturer willing to expend money on research and development. The Labelling of Food Order aims at preventing false descriptions and incorrect claims concerning the nutritive value and quality of packed foods, and from this aspect is important, but it is doubtful whether the other section of the Order, compelling total disclosure of ingredients, really is a protection to the consumer, and it appears to have been overlooked that it is a definite hindrance to the manufacturer.

Ingredients have to be printed on the label in the order of the proportions present, without disclosing the exact amounts. Supposing the more important constituent is present to an amount slightly in excess of 50 per cent., while the less important ingredient, which might be flour, is present in almost equal proportions, cheap and low quality products would result. On the other hand, another manufacturer desiring to make a high quality product may know that the inclusion of 5 to 10 per cent. of flour will confer desirable properties. His disclosure on the label will, however, be the same. Some more definite method of disclosure would therefore be required if it is to be effective.

While disclosure of the ingredients can be presumed to be of assistance to the housewife in assessing the quality of a product, this is really a moot point, despite the extension of education in food matters during the war. A full disclosure of the ingredients can, however, be of great value to the manufacturer's competitor, the unscrupulous one being encouraged to use a smaller proportion of the more expensive ingredient and claim the same proportions.

I think it is insufficiently realised that many well-known commercial products can be improved by small additions of specific ingredients which in themselves do not look of importance, so that full disclosure on the label would not encourage enterprising manufacturers to experiment to improve their products. This appears to have been realised in the case of pickles and sauces, since these are exempt from disclosure.

In the case of packed foods the manufacturer's interests could be guarded by compulsory disclosure of 90 to 95 per cent. by weight of the ingredients. This would leave a negligible proportion undisclosed which would cover colours, flavours, stabilisers and other special constituents which constitute the secret of the industry. If the low-grade manufacturer did include an extra 5 per cent. of undisclosed flour in place of valuable ingredients, it could not be said that the housewife was being seriously misled.

Further, such a scheme would enable a new firm to introduce worth-while products without disclosing the whole of his invention to his established competitor. This is only fair, since the established firm built up their reputation at a time when the formula did not need to be published.

It is hoped that the trade organisations will give this matter serious consideration and will urge a modification of the existing orders. This would prevent the tendency to copying and give greater incentive to the development of new ideas.

Yours faithfully,
S. M. TRITTON, M.P.S., F.R.I.C.

Trade News

Food Manufacturers' New Chairman

Liverpool and District Food Manufacturers' Association has elected Mr. George Moore (Richmond Sausage Co., Ltd.) as chairman in succession to Mr. H. M. Blackburn (J. A. Hunter and Co., Ltd.), who is retiring from business.

* * *

Paper Containers

The manufacturers of the noted Monocon paper container for the packing of food and pharmaceutical products, etc., Mono Containers, Ltd., are still mainly engaged on war work of high priority. A small proportion of their normal manufacture is devoted to packages for essential food and pharmaceutical products. Naturally, they and their many customers are anxiously looking forward to the time when commodities and paper will be in more plentiful supply. Prior to 1939 their various well-known types of containers were used by most of the wholesale and retail packers of food, pharmaceutical and other commodities throughout the country, and Mono will no doubt have many new features to introduce to the packaging trade in the post-war period.

The directors and staff are always eager to discuss any packaging problem which will help to bring post-war trade back to normal. In pre-war days this company manufactured containers with capacities of from 1 to 80 fluid ounces. During the war they have been manufacturing from salvaged paper, oil bottles, shell and cartridge cases, and many other units, including the 90-gallon jettison fuel tank. Lately, their energies have been directed to making waterproof, insectproof, and fungicide packages for the Far East.

During the years of war, research in container manufacture has been accelerated, due to the fact that we have been fighting for our existence. Consequently the trade will benefit by that experience.

New Fish Canning Factory

An Inverness canning company is proposing to establish a canning plant at Benbecula, one of the Hebridean islands, for the packing of fish and game. Meetings between representatives of the company and the island trappers and fishermen were held early in February, at which the prospects of such a venture were discussed. The islanders are famed for their lobster fisheries, and lobsters will form a considerable part of the pack, assuming that the project develops. The Scottish Council on Industry has given its approval to the proposal and the islanders have indicated readiness to co-operate.

At present all the fish in the islands has to be cured because of the distance from mass markets, and it is certainly likely that such a development would work to the advantage of the producers in that it would offer a ready market for their produce, which would be all used and paid for, instead of being subject to fluctuation of the distant markets and to the natural loss while in transit.

* * *

Tyroglyphid Mites in Stored Products

In September, 1943, the Department of Scientific and Industrial Research issued a *Survey of the Published Information on Tyroglyphid Mites in Stored Produce*. A supplement has now been issued which brings the information more up to date.

Tyroglyphid mites are of very common occurrence on stored produce such as grain, flour and cheese, where they may cause considerable damage.

The information both in the original pamphlet and the supplement has accumulated in the course of the research work being carried out by the Department on the control of infestation of stored produce.

Copies of the supplement, price 2d. (by post 3d.), and the original survey, price 9d. (by post 10d.), may be obtained from H.M. Stationery Office.

Pegson, Ltd.

The manufacturers of Pegson-Telsmith screens and quarry plants, the Pegson-Barco road ripper, Pegson-Marlow pumps and the Pegson rammer — Pegson, Ltd.—are moving their offices from their works at Coalville to 7, Iddesleigh House, Caxton Street, Westminster, London, S.W.1. The new telephone number is Abbey 2373 and the telegraphic address is "Melbrom, Sowest, London."

* * *

Industry v. Agriculture

The importance of agriculture to the city was emphasised by the Mayor of Exeter (Mr. Vincent Thompson) recently.

He contended that the great industrial areas were the greatest enemies to a fair deal for agriculture. Between and before the wars the industrial areas clamoured for cheap food, and their vote was ten times that of the agricultural vote. That was the problem which had to be faced.

Agriculture, he added, was of vital importance to Exeter.

* * *

Goodwill, 1861-1945

We have received a booklet containing the story of Joseph Lingford and Son, Ltd., and their welfare work. Priced at 1s., the proceeds are given to the British Red Cross Society and the Order of St. John of Jerusalem. This book, as is explained in a personal note, was prepared primarily for the use of new members of the Lingford staff, and also for sending to industrialists and to the public generally who are interested in welfare work and factory management. It consists of a concise description of the different angles of the work, set out under clear headings, and covers the whole field, from hours of work, handling of juniors, to pensions.

At the end of the book is an interesting history of the firm of Lingford, tracing its progress from the opening of a grocery shop in 1861 to the present time.

Imperial Institute

Number 4 of Volume XLII of the *Bulletin* of the Imperial Institute contains an article on the paper-making materials of the British Empire, being an abstract of a lecture delivered before the Royal Society of Arts. At the end of the article there is a very valuable list of references to the literature. There is also an excellent bibliography on insecticide materials of vegetable origin. This bibliography is published quarterly, and the one under review extends from July to September, 1944.

Among the book reviews is one of *Potato Collecting Expeditions in Mexico and South America*, Part II. The index to Volume XLII is included.

* * *

F.M.S. Bulletin

We have received the sixth war volume of the bulletin issued by the Farmers' Marketing and Supply Co., Ltd., which is an excellent example of a House journal. An interesting article on the firm has the caption "F.M.S. —Ten Years Old." The article starts with: "July 16th, 1934. One man and an idea; one room, one typewriter and a secretary—that was our beginning." There is little need for those in the industry to be informed of the present status of the undertaking.

The bulletin, which is illustrated, is full not only of House news but interesting technical articles.

It is announced that Mr. Robert Templeton, managing director of the Farmers' Marketing and Supply Co., Ltd., who has been chairman of the Executive Committee of the Compound Cattle Food Manufacturers of England and Wales, has now become the first President of the new Association, "The Compound Animal Feeding Stuffs Manufacturers' National Association," which is to take the place of the N.E.C. This is a great tribute to his personality and his ability, and it is also a reflected honour upon the pioneer work done by this young company in that it is considered worthy to stand alongside larger and older establishments as playing a very definite and positive part in advancing the welfare of British agriculture.

OBITER DICTA

- British farmers do not think big enough.—*New Zealand Farm Experts.*
- Children have been observed in Battersea playing with empty milk bottles as toys.—*South London Press.*
- Self-heating tins of soup may become available to the housewife after the war.—*The Daily Telegraph.*
- Since the beginning of the blitz until today, there has never been a case of bread shortage in Great Britain.—*Mr. W. S. Duthie.*
- We can cook here and cater here every bit as well as anyone in foreign lands if we really put our minds to it.—*Col. Llewellin, Minister of Food, at Cardiff.*
- There will not be any great easing of the labour shortage the moment Germany is defeated. There will not be any easing of the food shortage either.—*Col. Llewellin, Minister of Food.*
- A cheap food policy is a snare and a delusion. In the past it has impoverished both our overseas customers and our own agriculturists; if persisted in it may whittle away the very roots of our national life.—*Jorian Jenks, in the "British Weekly."*
- Our meat came from the Argentine, which means that all the taste was frozen out of it in transit; our fish and vegetables and soups were decanted from tins, our cream was synthetic, or purified, or pasteurised, or preserved, but was never just cream.—*C. E. M. Joad, in the "Yorkshire Evening Post."*
- It seems probable that the European war may end this year, therefore I suggest serious consideration be given with a view to supplying dairy farmers with increased allowances of protein feeding-stuffs for the winter of 1945-46 and thereafter.—*Mr. Weightman, in a letter to "The Times."*
- The Minister of Food, like the base Indian, has thrown a pearl away richer than all his tribe. His myopic gaze fixed on the magic word "nutrition," he hugs his white loaf, and, worse, hands it out to his obedient and credulous flock as a wonderful and excellent food; his pappy, sticky, tasteless, devitalised, concentrated, unnatural, abominable white loaf.—*Margaret S. Pollard, in a letter to "The Listener."*

Nuffield College Report

A report to the Ministry of Town and Country Planning on the North-East Coast and reports on West Yorkshire and the Grimsby fishing industry were mentioned in the annual report of Nuffield College to Congregation at Oxford recently.

The new Warden, Professor Henry Clay, reported that Lord Melchett and Sir Raymond Streat had been appointed Visiting Fellows, and that Mr. G. D. H. Cole, who had been appointed Professor of Social and Political Theory at Oxford, had resigned the offices of Sub-Warden, Director of the Reconstruction Survey and Chairman of the Survey Committee. Tributes were paid to Mr. Cole's work and to that of the First Warden, Mr. Harold Butler, whom Professor Clay succeeded in October.

* * *

Food Control Laws in Middle Ages

The similarity of some of the regulations of the Ministry of Food to the regulations in the Middle Ages and in Tudor and Stuart times was pointed out by Mr. W. R. Willis, of the *Yorkshire Post*, in an address to the York Archæological Society recently.

These ancient provisions, said Mr. Willis, were enacted to ensure a fair distribution of food and to preserve the economic ideal of "the just price." Every attempt was made to discourage speculative trading which might be to the hurt of the people. From the reigns of Edward I and Edward III dated the stringent laws against forestallers, regrators and engrossers.

Forestalling was buying, or contracting, for any merchandise or victual coming into the market; dissuading producers from bringing their wares to market; or persuading them to enhance the price when there. The engrosser bought up large quantities of growing corn or dead victual with a view to creating what we now know as a "corner." Regrating was buying in the market and selling again in the same market, or within four miles of the same place.

Vacuum Cleaners in Food Factories

During recent years considerable interest has been manifested by the Department of Scientific and Industrial Research Pest Infestation Department in the use of the vacuum cleaner as a means of reducing wastage and other troubles connected with the bulk storage of grain and the like in warehouses and barns and places of storage generally. It would seem that considerable wastage is experienced, due to the accumulation of dust and loose grain on floors and between floor boards, and on beams and ledges, etc., where it is apt to absorb moisture from the atmosphere, and as a consequence breeds weevils and other living organisms, which in due course attack the grain or flour in storage, rendering a certain percentage unfit for consumption and reducing its market value as well.

Efforts have been made to use portable machines capable of being carried up warehouse stairs, and some success appears to have been attained. These vacuum cleaners have been electrically driven, and are therefore limited to those places where electric power is available. Again, being restricted in size, their capacity is not always sufficient to meet the needs of users. Cost also has its economic limits, especially amongst the farming community, and in these cases, again, electricity is not always available.

In the case of large warehouses, the central electrically driven installation, with steel pipes running up vertically through the floors with points for attachment of flexible hose, is indicated.

For farms, a portable machine of about 6 b.h.p., driven by an air-cooled internal combustion motor, is the best proposition. Such a machine could be stationed outside the barn or other building to avoid danger of fire, and the flexible hose of desired length taken into the storage place for the removal of dust and waste material.

The whole problem might well be considered by those interested, as the desirability of cleaning out these places is obvious. The manufacturers of various food products who suffer from the dust problem might well apply the industrial vacuum cleaner in their factories with considerable advantage, as dust must be in many cases a serious menace to their products. The process has already been adopted by some manufacturers of biscuits, with favourable results.

Another development is the sack-cleaning plant, which enables food sacks to be rapidly freed from dust, and the capacity of such plant can be adjusted to requirements.

The application of pneumatic conveying for handling grain in bulk is, of course, well known, and needs no description.

The British Vacuum Cleaner and Engineering Co., Ltd., handle all these problems, and are prepared to consider any special requirements.

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Ice Cream Press Officer

Mr. E. Vincent Lawes has been appointed Press Officer to the Ice Cream Alliance, Ltd. For the five years preceding the war he acted as Press Officer to the National Dairy and Ice Cream Exhibition at Olympia, and he had other editorial and publicity interests in the dairy industry.

"The Press can be the most valuable friend to the ice cream trade and to the Ice Cream Alliance," said Mr. Vincent Lawes in an interview, "but both the trade and the trade organisation must reciprocate that friendship and be worthy of it.

"The trade, as all trades and industries, must realise that service to the public is the essence of their existence. Any tendency to profit unduly from an unusually keen demand for ice cream likely to be experienced this season, because of the refreshing appeal of its reappearance, or because of shortage of supply, will react a thousandfold against the trade. The Press has not earned its title as the 'watchguard of the public' for nothing, and its power is enormous.

"Again, it is to be expected that only hygienic methods of manufacture will be used," said Mr. Lawes, "and that every effort will be made to provide wholesome ice cream, high in nutritious value. The trade has a great opportunity to establish its product in the public mind on a new high level of recognised food value."

Potatoes and Summer Time

One of the reasons why many acres of potatoes remained unlifted in Scotland in 1944 was the inability of a large number of casual workers to withstand the cold weather conditions in the early hours of the morning.

So states a memorandum underlining the harmful effect of double summer-time on food production in Scotland, which has been issued by the Board of Directors of the Highland and Agricultural Society of Scotland.

* * *

Commercial Electric Refrigeration Association

At the second annual luncheon of the Commercial Electric Refrigeration Association, Mr. E. G. Batt, the independent chairman, gave an account of the general position to date. The Association has a total membership of 248 firms, representing machinery manufacturers, insulation contractors, distributors and service engineers. In conjunction with the Government Departments concerned, the Association continues to handle the arrangements for the distribution of such things as Freon, bitumen, timber and motors for servicing requirements.

Mr. Batt went on to discuss rehabilitation after the war and the disposal of surplus Government stores. Other subjects touched upon were a fair trading code for the regulation of business between all sections of the refrigeration industry, so as to ensure that the function of each is defined and understood; the matter of export trade and the different functions of the C.E.R.A.

The guests were addressed by the Right Hon. A. V. Alexander. He paid a tribute to the work of the C.E.R.A. in meeting the needs of the Royal Navy and Merchant Navy.

The British Navy was an all-weather navy and must be ready at a moment's notice to sail from one corner of the globe to another, from the Arctic to the Tropics. Warships of all sizes are fitted with electrically driven refrigerating machinery for the preservation of bulk supplies of perishable foodstuffs, for making ice, for cooling certain magazines to maintain explosives at the correct temperatures, for air conditioning of

the entire craft in submarines and of important action compartments in surface ships, for cooling drinking water, for the storage of blood sera, vaccines and drugs, and for the manufacture of ice cream for ships' companies.

The Admiralty are now faced with problems of victualling, provisioning, maintenance and supply of a huge fleet in oceans sparsely inhabited and lacking in the resources of modern war and the elementary amenities of civilised life.

War against Japan has increased the Navy's demands on the refrigeration industry of the country enormously and shown the need for big increases in the number of air-conditioning plants, water coolers, ice cream plants, etc., which will involve, in many cases, new designs, and at the same time adaptation of manufacturing methods to mass production.

Turning to merchant shipping, Mr. Alexander said that it was about the end of 1940 that the problem of refrigeration began to emerge. It was found that refrigeration space available would meet only about 30 per cent. of the Ministry of Food's requirements. At the end of 1941 it was decided to expand the refrigerated shipping space by various means as soon as possible. In 1942, 1943 and 1944 eleven million cubic feet of insulated space was provided in large refrigerated cargo liners, which were designed for the carriage of cargoes after as well as during the war. Also as an emergency measure a number of tramps were selected for temporary refrigeration by the insulation of two or three of their holds.

Insulating technique had to be drastically modified—slag wool packed into laminated fibreboard substituted for cork, fans and coolers installed to supply cold air, the refrigerating machinery being of the direct expansion type.

While a comparison of imports for the pre-war and early war years with those of the first half of 1944 will show reductions in wheat and flour, rice and grains, maize, animal feedingstuffs, sugar, fruit and vegetables, imports of meat and bacon remained steady and finally increased. This is some measure of the contribution made by the refrigerating industry.

Retirement of Mr. T. Macara

Mr. Thomas Macara, who has been for twenty-five years the Research Director of the British Association of Research for the Cocoa, Chocolate, Sugar Confectionery and Jam Trades, retired recently from the Directorship of the Association and from that of the associated body, the British Food Manufacturers' Research Association.

Throughout the whole of his professional career he has been connected with the food industry, and recognition of the services which he has rendered both to the industry and to the public has come from many quarters. For the help which he has given the Ministry of Food through the Research Associations he has been handsomely thanked by the Minister of Food and Sir J. C. Drummond, and he still remains a member of the Food Investigation Board. The confidence which the Food Manufacturers' Federation and the Manufacturing Confectioners' Alliance have in the two Research Associations is due largely to him. It is good to know that the benefit of his long experience and advice will not be lost, as arrangements have been made whereby his services will be retained as technical consultant.

Dr. L. E. Campbell, who has been Assistant Director for many years, has been appointed to the Directorship of the two Research Associations.

* * *

"Branded" Gelatine of Controlled Quality

The key to the popularity of many branded goods in everyday domestic use lies in the fact that when a favourite branded product is required, the buyer knows exactly what to ask for and what he is going to get. Conversely, by branding his goods, the manufacturer sets himself a standard from which he cannot and dare not depart, and in turn it undoubtedly pays him also to use, where possible, well-known branded raw materials of fixed and dependable quality. This is the reason why Alfred Adams and Co., Ltd., have decided to apply the name "Silver Stream" to all their graded gelatines.

In these matters the manufacturer of gelatine is in a particularly difficult position, as it is impossible for him to standardise his own raw materials, because they are of animal origin. The conclusion was therefore come to that if the users of Silver Stream gelatine were to have all the advantages normally associated with a genuine branded product, a grading system must be devised by which the gelatines could be absolutely controlled within narrower limits than had ever been attempted previously.

It immediately became apparent that this was only possible by grouping batches within narrow limits, powdering and kibbling them, and then combining them scientifically within each grade so that any deficiency in any one batch is counterbalanced by an abundance of that characteristic in another. Thus is each grade of gelatine maintained within a rigid specification from which there is no departing, and this is why it is obtainable only in powder or kibbled form.

* * *

Industrial Pest Control

The fourth in the current series of lectures arranged under the auspices of the Industrial Pest Control Association was held on February 12, 1945, at the Film Unit Theatre, Shell-Mex House, Strand, W.C. 2. The subject was "Combined Operations," and the speaker, Dr. A. B. P. Page, Imperial College of Science and Technology, referred to "combined operations" as the simultaneous use of more than one method, physical or chemical, to eliminate infestations of insects or rodents. He suggested the greater use of stimulants or irritants preferably incorporated in, and applied with, existing or new pest control products which increased the activity of the pests, thereby increasing the possibility of contact between the pest and the lethal product, or, where this contact is assured, the picking up of a lethal dose by the pests. Dr. Page referred to activators and synergists at present employed where this stimulating or irritating effect was made use of, and suggested that the search for products with these properties might be complementary to the search for products with insecticidal activity.

Mincers and Mixers

Concerned before the war with producing high-grade electric food preparing machines, such as "Swallow" Meat Master Mincers, etc., but during the war having had to reduce their output of this type of equipment substantially in order to concentrate upon more important work, B. and P. Swift, Ltd., are now again producing their post-war range of machines. In addition to all types of automatic weighing machines, there are electric mincers, combination bowl cutting and mincing machines, gravity fed electric slicers,, potato peelers, and cake mixers.

A priority list for the above is now being compiled, as there is no doubt that when supplies are again available there will be a very considerable demand.

It is an indication of the importance that the food trades are assuming in the minds of manufacturers that a firm which specialises in mechanical, electric and hydraulic engineering should devote themselves to their needs.

* * *

Industrial Plant in Glass

The unique properties of glass have resulted in its almost exclusive adoption as a material in which to carry out laboratory processes where need for purity and freedom from contamination are essential. Until recent years, however, the difficulties associated with the construction of larger equipment have limited its field of application to the laboratory. Development work on the part of Quickfit and Quartz, Ltd., however, has resulted in the production of industrial plant of sufficient mechanical strength to be satisfactorily used under full-scale manufacturing conditions, even though it is operated and serviced by personnel previously unused to handling glassware.

From the point of view of the food manufacturer, the chief advantage of glass is the freedom from contamination of the foodstuffs, which are either contained in the glass vessels or transported through the glass pipes. Cleanliness can be ensured visually, so that laboratory conditions of purity can be maintained.

The type of equipment available includes pipelines in diameters 1 to 12 inches for the transportation of such material as fruit juices, vinegar, salad cream, etc.; storage vessels up to a capacity of 33 gallons; heat exchangers and condensers in individual units of surface areas up to 25 sq. ft. Small batch production equipment can be constructed for the production of essences, flavouring material, etc.

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The Institute of Physics

The X-Ray Analysis Group of the Institute of Physics has announced that its 1945 Conference (the fourth in the series) will be held on April 12 and 13 next at the Royal Institution, London, under the chairmanship of Sir Lawrence Bragg. The programme includes a lecture by Professor J. D. Bernal on "The Future of X-Ray Analysis," and a series of papers on new and improved methods. Discussions are to be included on the equipment of a laboratory for X-ray analysis, the interpretation of X-ray diffraction by optical principles, and the proposal to convert X-ray wavelengths to absolute values.

Further particulars may be obtained from Dr. H. Lipson, F.Inst.P. (the Honorary Secretry of the Group), Crystallographic Laboratory, Free School Lane, Cambridge.

Physicists employed in industry in South Wales and the surrounding district have for some time felt the need for local opportunities for the interchange of knowledge and experience of applied physics. At their request the Board of the Institute of Physics has therefore authorised the formation of a South Wales Branch of the Institute, which is to be centred on Swansea.

The inaugural meeting of the branch took place on March 10 in the Physics Department of University College, Swansea, when Dr. C. Sykes, F.Inst.P., F.R.S., a member of the Board of the Institute and Principal of the Brown-Firth Research Laboratories, Sheffield, delivered an illustrated lecture on "Physics in Metallurgy."

Further particulars of the branch may be obtained from the Acting Hon. Secretary, Dr. T. V. I. Starkey, A.Inst.P., The Technical College, Mount Pleasant, Swansea.

Paperboard in Reels

During the ten years preceding the war there was an increase in the installation of plant employing paper board in the reel instead of the sheet, and, no doubt, after the war this development will be accelerated.

A point that is often overlooked in the designing of machinery for this purpose is the advantage to be gained by employing reels of a reasonably large diameter. Many plants are now using reels up to 60-inch diameter with considerable advantage to output, but on the other hand machines are far too often designed only to take light-weight reels, which means relatively small yardage. What is often overlooked is that every inch increase in diameter means a progressively greater increase in yardage. For example, a reel 24 inches in diameter will give a yardage of approximately 754 yards in caliper 0·016. In the same thickness of board a reel of double the diameter—48 inches—will give a yardage of 3,071 yards. This means that one reel in the larger diameter will last four times as long without changing. A reel 60 inches in diameter would last more than six times as long. This means not only saving of time in stoppage and saving of handling, but with every change there is a loss of material which is considerably reduced by the fewer changes. It therefore means reducing changing time and waste due to change by 75 per cent. in the first case and about 83 per cent. in the second.

Even during the war, plant has been installed for using board in the reel in which this important point of production efficiency has been overlooked. Once the machine has been installed it is often expensive to make a change, whereas if design and layout of plant is planned in the first place with this important feature in view, the little cost, if any, which is involved will yield a permanent revenue.

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Board Appointment

Mr. A. H. N. Wells, who has been the company's works manager for sixteen years, has recently been appointed a director of A. Boake, Roberts and Co., Ltd.

Company Meetings

Eburite Corrugated Containers

At the ordinary general meeting of Eburite Corrugated Containers, Ltd., held recently, Mr. J. H. Downey, the chairman, said: The profit on trading for the year 1944, after providing for taxation, amounts to £32,374, as compared with £26,587 for 1943. In this amount nothing has been included for the profit earned by the wholly owned subsidiary company, Andrew Ritchie and Son, Ltd., for 1944, and dividends payable in respect of that year will form part of the income of the parent company for 1945.

After providing for directors' fees and depreciations, and deducting the fixed Preference dividend at 5 per cent., less tax, and the interim Ordinary dividend at 5 per cent., less tax, and taking credit for the carry-forward from last year, the available balance totals £22,974, which it is proposed should be disposed of by a transfer to reserve of £5,000 and the payment of the participating dividend of 2 per cent., less tax, on the Preference shares, a final dividend of 20 per cent., less tax, and a bonus of 5 per cent., less tax, on the Ordinary shares, which, with the interim dividend of 5 per cent. already paid, makes a total distribution of 30 per cent., less tax, as compared with 25 per cent. for 1943. The increased distribution is payable on the increased Ordinary capital for 1944. The balance carried forward to 1945 is £4,143.

The balance sheet sets out the fixed assets at cost and the aggregate provision for depreciation to date, showing that such assets have been properly depreciated. The consolidated balance sheet submitted, which incorporated the resources of Andrew Ritchie and Son, Ltd., shows, after allowing for proposed appropriations, net liquid assets amounting to £210,201, which well exceeds the company's issued share capital. The reserves and surplus total £133,456. Under present conditions a considerable amount will be payable to the company by way of a post-war credit, and nothing has been included in the accounts for this contingency. The heavy demand for the company's product continued throughout 1944 and is being maintained during the current year.

The trading results of the wholly owned subsidiary company during the first year since acquisition are satisfactory, and output has shown a substantial increase.

The report was adopted.

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Bovril, Ltd.

The forty-eighth annual general meeting of Bovril, Ltd., was held in London on Monday, March 12. The following is an extract of the statement by Lord Luke (chairman) circulated with the report and accounts:

In the profit and loss account, the profit before taxation amounts to £494,389, a decrease of £87,893 as compared with the previous year. This result was reached after a considerable increase in sales had been counterbalanced by a greater rise in the cost of production. The estimated provision for taxation, including excess profits, arising on the profits to December 31, 1944, is £304,000, a reduction of £91,429 as compared with last year. The net profits after taxation are therefore £3,510 up, at £165,765.

The question of continued or greater control of industry by the State will not have escaped the notice of shareholders. Which is likely to contribute most to efficiency? Freedom for enterprise and initiative by the best brains of industry, experienced in the industry's particular problems and needs, or the restraint of that free initiative by State control?

These are questions on which shareholders will have decided views. And rightly so. For investors are no mere spectators on the side-line. They are vitally concerned in how industry shall be run, and they will certainly have something to say before they see their savings nationalised and taxation increased to enable the State to pay their compensation.

You will be interested to know that, in addition to the normal production of Bovril for home front and forces overseas, Bovril, Ltd., has to date manufactured or

Societies

Food Education Society

The Food Education Society announce a series of three lectures at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1. At 2.30 p.m. on April 16, "Food—the Science, the Logic and the Art," by Mr. A. L. Bacharach, M.A., F.R.I.C.; April 23, "Food and Agriculture," by Lord Portsmouth; May 3, "Food and Physique," by Sir Adolphe Abrahams. Chairman, Lord Horder, G.C.V.O., M.D.

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Society of Instrument Technology

A meeting of the Society of Instrument Technology will be held at the London School of Tropical Medicine, Keppel Street, London, W.C.1, on Saturday, April 21, 1945. The morning session will commence at 11 o'clock and the afternoon session at 2.30 p.m. The President, Sir G. P. Thomson, M.A., F.R.S., will be in the chair, and three papers will be read and discussed. Any non-members of the Society who wish to attend should apply to the Hon. Secretary, Mr. L. B. Lambert, 55, Tudor Gardens, London, W. 3.

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The Royal Institute of Chemistry

The Royal Institute of Chemistry announce the following meetings:

April 18, Wednesday, at 6 p.m., in the Lecture Theatre, The Pharmaceutical Society, 17, Bloomsbury Square, W.C. 1. "Some Empire Vegetable Oils." Mr. G. T. Bray, F.R.I.C.

May 16, Wednesday, at 6 p.m., in the Lecture Theatre, The Pharmaceutical Society, 17, Bloomsbury Square, W.C. 1. "The Theory and Practice of the Microbiological Assay of the Vitamin B Complex, Selected Aminoacids and Potassium." Dr. E. C. Barton-Wright, F.R.I.C.

Continued from previous column

packed during the war millions of special rations for the fighting services.

News from the Ministries

Amendments to Orders

The Minister of Food has made an Order, which amends the Manufactured and Pre-packed Foods (Control) Order, 1942, prescribes an appointed day thereunder, and revokes the Flour and Flour Mixtures (Current Prices) Order, 1942.

The Order provides that a change in labelling made solely in order to comply with the Labelling of Food (No. 2) Order, 1944, or any other change in labelling made with the Minister of Food's approval, shall not oblige a manufacturer or pre-packer to hold a licence which would not otherwise be necessary.

This Order also brings into force Articles 5, 6, 7, and 8 of the Manufactured and Pre-packed Foods (Control) Order, 1942, in respect of Flour Mixtures, rendering obsolete the Flour and Flour Mixtures (Current Prices) Order, 1942, which is accordingly revoked.

* * *

Mr. W. S. Duthie

Mr. W. S. Duthie has been selected by the Minister of Food to take charge of food distribution in the Balkans. His official designation will be Deputy Chief of the U.N.R.R.A. Balkans Mission. The first six months, he told the *Yorkshire Post*, he will spend looking over the situation. Greece would be his first field of operations.

To Mr. Duthie, perhaps more than anyone else, credit is due for the fact that there has never been a bread shortage in Britain during the war. He created the nation-wide Emergency Bread Organisation. In this organisation are some 1,500 voluntary bread officers, responsible for bread supplies in their districts during emergencies.

A classic example of their work occurred during the Merseyside blitz when that area was bombed continuously for nine nights. The bakeries in the town were put out of action. During eight successive days the Emergency Bread Organisation distributed 1,750,000 2-lb. loaves. Most of this bread was brought from Manchester.

Divisional and Local Organisation

The Minister has appointed Mr. O. A. Lake to be Divisional Food Officer for the North Wales Division with effect from February 3, 1945.

Mr. Lake has been in the service of the Ministry of Food since the outbreak of war and has been a Deputy Divisional Food Officer in the North Wales Division since April 1, 1942.

* * *

Seed Potatoes

The Minister of Agriculture (the Rev. R. Moore), speaking in the Northern Ireland House of Commons this week, said that the Ministry of Agriculture attached the greatest importance to the building up of an export seed potato trade which had expanded from 18,000 tons in 1939-40 to 48,00 tons in 1943-44.

In 1944-45 they had exported seed potatoes to seventeen different countries, including new markets in Yugoslavia, and shipments would probably be well in excess of 50,000 tons.

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Supply of Milk in England and Wales

In a question and reply (written) in the House of Commons, March 1, 1945, Wing-Commander James (Wellingborough) asked the Minister of Agriculture and Fisheries what was the supply of milk in England and Wales in January, 1945, as compared with January, 1944, and the average supplies in January before the war.

The Minister of Agriculture (Mr. R. S. Hudson): The supply of milk in England and Wales for January, 1945, was 89,000,000 gallons, as compared with 87,000,000 gallons in 1944, while the average supply in the month of January in 1937, 1938 and 1939 was 76,700,000 gallons.

I regard this as a really fine performance on the part of farmers, particularly as the weather conditions last month were very unfavourable.

Amendment to the Meat Products, etc., Order

The Minister of Food has made an Order (S.R. & O. No. 216 of 1945) amending the Meat Products, Canned Soup and Canned Meat (Control and Maximum Prices) Order, 1944, S.R. & O. No. 763 of 1944, as amended.

The new Order revokes the provisions of the main Order for the labelling of canned meat or fish paste, canned soup and canned ox or calf tongue as from the dates on which these specified foods must comply with the Labelling of Food (No. 2) Order, 1944 (S.R. & O. No. 1447 of 1944).

The new Order also provides for an addition of 6d. per dozen tins to the maximum wholesale price, and ½d. per tin to the maximum retail price, of canned Kosher Ready Meals in 16-oz. tins.

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Poultry Black Market

Black markets in poultry and rabbits were discussed in the House of Commons recently.

It was suggested that the whole turkey production of East Anglia had gone to the black market. Prosecutions, one M.P. said, were like trying to stop a leak in a battleship.

Mr. Stourton (Cons.), who raised the subject on the adjournment, alleged that poultry and rabbits went mostly to hotels and restaurants and the black market. Meanwhile the unfortunate and long-suffering British public went without.

He believed that the Ministry of Food Order controlling the prices of poultry and rabbits gave an opportunity to black marketeers. Under the Order the growth of the black market had become very pronounced.

Another thing against the Order was mal-distribution. It was not giving traders the opportunity of getting the limited supplies that were available. The public, too, were denied their fair share of poultry and rabbits.

Poultry could not be raised in reasonable quantities and the prices fixed did not show a reasonable return to the producer.

Colonel Llewellin, Minister of Food, said that poultry did not become scarce because of the Order controlling the prices of poultry and rabbits. The Order was put on because poultry were becoming scarce.

As far back as 1940 the prices of poultry were running up to 2s. 6d. or 3s. a lb. At that stage the Order brought them down to a figure of round about 1s. 11d. a lb.

He had taken the best advice he could as to what would be the likely price to which poultry would go up were he to take off this Order, and it was given as 5s. a lb.

He warned the House that the world meat supply was very difficult at this time. The shipping situation this year was also extremely difficult.

The black market was not so big as had been made out and he asked for facts. People must not be made to pay black market prices in order to get rid of the black market.

Supplies would provide less than one chicken and little more than one rabbit per person per year, and there was not enough to run a rationing system on supplies so inadequate.

* * *

Licensing of Food Retailers

The Food (Licensing of Retailers) Order, S.R. & O. No. 131 of 1945, which came into force on February 18, replaces the Food (Local Distribution) Order, S.R. & O. No. 291 of 1943, as amended, and the General Licences issued under it. It follows the general lines of the Local Distribution Order and existing licences remain valid, but are subject to the condition that they apply only to the premises named on these licences unless otherwise stated. The only change of substance is that sales of unrationed food made otherwise than by way of trade or business are exempted from the Order. Thus, a licence is no longer required to sell unrationed food at a charitable or other function; the sale of rationed food is not allowed.

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Bread Subsidies

After meeting representatives of the bread-baking industry in Scotland and Northern Ireland, the Ministry of Food decided to adjust the rate of bread subsidy in those countries. The new rates are 9s. 3d. per sack in Scotland and 5s. per sack in Northern Ireland. They came into effect on January 7 and February 11 respectively.

Overseas Items

Glucose Produced in Canada

At an estimated cost of $100,000, Western Chemurgy, Ltd., will soon begin to produce glucose and starch from wheat in the building formerly occupied by the Moose Jaw Brewery. "The production of glucose and starch is essentially a peacetime industry," the annual report of the Board of Trade points out, "and not a temporary war measure. This assures that the project will be a definite asset to the community after the war." —*Reuter's Trade Service.*

* * *

Tangerine Syrup

The U.S. Citrus Products Station at Florida has developed a tangerine syrup which is said to be rich in sugar and vitamins.

It is described as a light-brown, honey-like substance which is high in vitamin C. It can be bottled for home use or shipped in containers.

It is believed that the new product will provide an outlet for that part of the tangerine crop for which otherwise there is only a poor market.

Argentine Grain Stocks

Stocks of wheat in Argentina as at February 1 are officially estimated at 6,016,808 tons, while linseed amounted to 735,470 tons.

Other grain stocks included 285,148 tons of oats, 344,605 tons of barley, 174,656 tons of rye, 10,067 tons of birdseed, and 173,201 tons of sunflower seed.

These figures only include stocks held by traders and industrialists.—*Reuter.*

* * *

New Vitamin for Germans

Reports say that armament workers in Germany employed in underground factories are given a new vitamin food called "Auzon."

Auzon is said to be made of oats, which are mixed with various other types of grain, and has been patented as a vitamin capable of increasing 20 per cent. a man's "intelligence, technical capacity, power of concentration and ability to stand monotonous tasks."

The inventor of Auzon is a Rostock professor.—*Reuter's Trade Service.*

Increased Use of Wheat Starch

Attention has been drawn recently to the increased industrial utilisation of the starch and protein content of wheat flour. There appears to be little doubt but that wheat starch is equally as good as that produced from other sources, such as corn, potato, rice, etc., says the *Canadian Pacific.*

The United States Department of Agriculture is credited with developing two new simple processes for producing starch from wheat flour. The research was promoted when a shortage of corn starch for the manufacture of glucose syrups, or the so-called corn syrup, became apparent in 1942. The two processes are known as (1) the alkali process, and (2) the batter process, respectively.

There are two interesting angles to the possibility of expanding the use of wheat flour as a source of starch, especially in particular areas of Canada. Flour from "soft" wheat is apparently high in starch, and, accordingly, is a desirable raw material. Existing beet sugar equipment probably could be adapted to the production of starch, also the conversion (by acid hydrolysis) of starch to syrup.

It is interesting to note that the Ogilvie Flour Mills Company, Ltd., is now producing wheat starch and gluten at its Fort William, Ontario, plant. According to published figures, 15 tons of starch and 3 tons of gluten are produced daily from 25 tons of flour.—*Reuter.*

* * *

N.E.I. Black Pepper

The U.S. *Journal of Commerce*, quoted by Reuter, says that "the quickening pace of the war in the Pacific is directing attention towards the Netherlands East Indies and the possibility that 1945 may witness the liberation with the subsequent resumption of black pepper shipments to the United States.

"The existing prospective conditions do not, however, warrant the expectancy that the present downward trend of stocks in the U.S. will be reversed before a still lower level is reached, according to trade opinion.

"During the period of Japanese occupation, a large diversion of acreage from pepper to food crops has taken place, which will have to be reversed first. In addition, it will take considerable time to restore inland transportation facilities," the journal adds.

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British Empire Chamber of Commerce in the U.S.A. Inc.

Although the report entitled "Post-War Markets for British Groceries in America" was published by the Post-War Planning Committee of the British Empire Chamber of Commerce in the U.S.A., Inc. in 1943, it merits the attention of those interested in the export trade for these commodities. It purports to reply to the question, "Can British groceries be sold in America?" The examination of past figures of British food exports to America reveals a dismal state of affairs, it is stated. So far as merchandise is concerned, there is no good reason for this. British grocery lines enjoy consumer acceptance where they are displayed. The fault must lie in the distribution method, and it seems clear that major changes will have to be made. The report goes on to describe what these changes should be. Some of the other points discussed are advertising, packaging and so on.

With regard to the future of Britain's share of the market, the report states that much will depend upon circumstances beyond the control of individual firms. It has been assumed that tariffs will not be prohibitive and rates of exchange not unfavourable.

* * *

Colonel Bradley Dewey

Colonel Bradley Dewey was the recipient of the Society of Chemical Industry's medal in New York on November 10, 1944. Born in Vermont in 1887, he graduated in chemistry at Harvard and afterwards studied at the Massachusetts Institute of Technology, and became a skilful and competent chemical engineer and an able administrator. He was for a period in charge of the research activities of the American Sheet and Tinplate Company of Pittsburgh. In 1917 he was put in charge of the supply of gas masks for the American Army, and carried out this task with such success that he was given the rank of colonel and awarded the Distinguished Service Medal. For twenty-five years or more he has been an important character in the American chemical industry, and during this present war has been the Rubber Director.

In the course of speeches made on the occasion of the presentation of the Society's medal by Mr. Charles Almy and Mr. Vannevar Bush there occurs the following: "He brought to Washington something very real and vital, and there was a great gap when he left. He brought a directness of approach into an area where circumlocution was only too often present. He brought an unflinching intellectual honesty that was soon recognised for its exact nature and correspondingly respected. Into a maelstrom where many men were battling vigorously for their respective worthy ends he brought to the fray a frankness, vigour and validity which raised the struggle to a higher plane and left no sting behind. With it he combined a generosity, based on the existence of common objectives, which all acknowledged, and a willingness to go out of his way to help a fellow-administrator in trouble. He battled with many men in high places. When he left, they all gathered as his firm friends to do him honour."

Colonel Bradley Dewey's address on "The Role of Organised Research and Business in American National Defence" on receiving the medal, is published in full in *Chemistry and Industry*, Feb. 3.

* * *

New U.S. Starch Material

A new material from starch, with potential industrial uses in lacquers, resins, paper and textiles, is reported to the American Chemical Society, says the *Journal of Commerce*.

It is allyl starch, produceable as a soft, gummy material or as a powder. This starch, which forms a hard, durable coating on exposure to air, can be made from potato and sweet potato starch, corn starch, and tapioca dextrin.

When dissolved in ordinary lacquer solvents, the researchers explain, allyl starch can be used as a protective and decorative coating for wood, glass, metal, and other surfaces. Because of its high resistance to various solvents, to heat, and to solutions of acids and alkalies, it is being tested by several manufacturing concerns as a lacquer and varnish for household and office furniture and other articles.

"It can be used for coating and impregnating paper and textiles, and it acts as a thermosetting adhesive suitable for preparation of laminated products," the report adds.

"Allyl starch can also be used for the preparation of rigid plastics. When compounded on a rubber mill with various ingredients, including sulphur and vulcanisation accelerators, and 'vulcanised' in a press, the gummy material forms a rigid plastic which is highly resistant to various solvents and other chemical reagents. The milled product, when placed between layers of wood, paper, or cloth, and heated under pressure, yields laminated materials of various degrees of strength and usefulness."

Allyl starch can be made in large quantities, the report said, in a process using air-dry starch, sodium hydroxide, acetone, and allyl chloride. The allyl starch contains about two allyl groups per glucose unit.—*Reuter.*

Information and Advice

Marshmallow Cream and Lemon Curd

9,827. *Required recipes for marshmallow cream and lemon curd.* (S. Africa.)

Marshmallow Cream. Make a solution by dissolving 2½ oz. of agar-agar in ½ gall. water for 24 hours. Boil together :

12 lb. sugar
12 lb. glucose
3 pints water

to 240° F., then add the agar-agar solution and heat to 225° F. Make a meringue of 3 pints of egg whites and 1 lb. sugar. Add the solution and whisk until very stiff.

Lemon Curd. The formula given below will serve as a basis for experiment :

Sugar	60 lb.
Glucose	12 ,,
Margarine	4 ,,
Eggs	½ doz.
Lemon juice	1 gal.
Essence of lemon	2½ oz.
Wheat flour	6 lb.
Cornflour	6 ,,
Water	5½ gal.

Colour as desired.

Make the flour into paste with 2½ gal. of cold water and stand overnight. Add the sugar and glucose to rest of water in jar. Boil to 245° F. and cut off steam. Mix in the margarine. Add the eggs, previously whisked. Add the flour and paste and stir well. Add the lemon juice. Gently raise to 180° F. and simmer for 15 minutes. From this formula you will observe that there is nothing elaborate required in the way of utensils.

Canning Bilberries

9,697. *Required information regarding the processing and canning of bilberries, also the equipment needed for this.* (Durham.)

The canning of bilberries follows the technique of fruit canning in general and obviously needs a general knowledge of the industry. To give a full account of this business from A to Z is not within the scope of this information service, but, roughly, the following is the method suggested :

The berries are removed from the bushes by means of a scoop with projectors like forks. They are then carefully washed, and those containing maggots separated. The berries are packed in cans and covered with water when the product is destined for the bakery, or 18° Brix syrup for table use, although a 30° Brix syrup produces a superior article. Closing the cans and sterilisation follow.

Among the machinery required would be : tanks for washing, syruping machines, double seaming machines, exhauster, etc.

Information Supplied

9,760. *Names of firms specialising in the machinery for the manufacture of salad cream and mayonnaise.* (London.)

9,762. *Names of firms supplying machines that mix and sift minerals such as iron oxide.* (Scotland.)

9,763. *Information regarding ready-mix ice cream powder.* (London.)

9,765. *Information concerning a machine for opening 6-lb. cans at the rate of 200 per hour.* (Warwickshire.)

9,767. *Names of suppliers of various types of ice cream powders.* (London.)

9,771. *Names of millers of groundnuts.* (London.)

9,775. *Information regarding coffee essence.* (Eire.)

9,776. *Information regarding the preservation of shellfish.* (London.)

9,781. *Information regarding fish and meat pastes.* (Egypt.)

9,784. *Names of suppliers of vegetable purées for infant feeding.* (Surrey.)

9,791. *Names of manufacturers of machines for margarine manufacture, makers of packing machines and makers of plant for biscuit manufacturing.* (London.)

9,801. *Information regarding shortbread.* (Westmorland.)

9,811. *Information regarding the manufacture of ice cream.* (Surrey.)

9,812. *Name and address of a firm supplying wheat albumen or protein.* (Surrey.)

9,813. *Names and addresses of makers of air-conditioning plants and refrigerators.* (India.)

9,816. *Names and addresses of suppliers of plant for hydrogenation, dehydration, manufacture of pickles, and milling machinery.* (Lancs.)

9,817. *Names and addresses of firms supplying ice cream-making plant and biscuit-making machinery.* (London.)

9,824. *Name and address of suppliers of an emulsifier which is neither gum nor egg.* (Scotland.)

9,828. *Name and address of a supplier of beef powder.* (Northumberland.)

9,829. *Name and address of suppliers of Toughide.* (Herts.)

9,833. *Name and address of firm supplying equipment for closing Cellophane bags by heat processes.* (Scotland.)

Information Required

9,825. *Name and address of suppliers of a chemical or enzyme which would soften the fibre in pineapple cores.* (Australia.)

9,909. *Address of the manufacturer of Vinacet, a liquid spice essence used in vinegar for pickles.* (Scotland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in the Manufacture of Cream Substitute

The process according to the invention comprises taking an edible vegetable and/or animal oil or fat base and emulsifying it with an aqueous serum containing an edible vegetable flour, and stabilising the emulsion with a harmless stabilising agent, an edible vegetable gum being incorporated for the purpose of minimising the tendency of the cream, when it has been beaten, to exude liquid serum on standing. The edible vegetable oil may be an oil of the leguminosæ group and/or an oil of the palmæ group.

The edible vegetable flour may be a flour derived from the Glycinæ and/or a flour derived from the Graminosæ. A flour which is derived from the Glycinæ and is particularly useful as an emulsifying agent when employed in the process according to the invention is soya bean flour.

The stabilising agent may be an ionisable inorganic compound, preferably a salt of tribasic acid such as a phosphate and/or a citrate. The stabilising agent may also contain a harmless chloride—*e.g.*, common salt. A suitable amount of common salt improves the taste of the cream substitute.

The edible vegetable gum may be Gum Karaya and/or a marine vegetable gum, preferably an alginate, such as the brand of sodium alginate known under the Registered Trade Mark "Manucol."

Glyceryl monostearate and/or a phosphatide such as lecithin and a small proportion of a colouring constituent and of a flavouring essence are preferably incorporated in the cream substitute.

The resulting crude emulsion produced is then subjected to a series of operations involving successively heating to a controlled temperature, homogenising at controlled pressures, cooling to controlled temperatures and keeping in cold storage at a controlled temperature.

If desired, a requisite proportion of a suitable substance rich in vitamins (*e.g.*, vitamins A and D) may be included in the product; this could be introduced advantageously during the final cooling stages.

The final product, which resembles natural cream in consistency, appearance and flavour, is capable of being whipped to an aerated mass just like natural cream to give up to 200 per cent. overrun and, in the whipped state, of being piped and "worked" exactly as other similar products and also natural cream can be treated.

561,532. Reginald Dean Mason and Aage Christian Justesen.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

564,642. STODDART, J.: Packing boxes and like containers.
564,689. NILSSON, A. E.: Separator for dust or other solid impurities.
564,708. PATERSON, Sir W.: Process and apparatus for treating liquid.
564,715. GEE, L. F. and GEE, Jun., J. S.: Cap closures for containers.
564,732. COOPER, MCDOUGALL AND ROBERTSON, LTD., and CAHN, R. S.: Insecticides.
564,772. HAWTHORNE, J. R.: Egg products.
564,777. KELLIE, R. W. and KELLIE AND SON, LTD., R.: Machines for removing the rind or skin from fruit and pulping the fruit preparatory to the manufacture of marmalade and other preserves therefrom.
564,838. COOPER, G. W.: Machines for collecting and/or raising crops.
564,843. STRAUSS, A. S. M.: Vegetable strainers.
565,032. BRITISH FOOD MANUFACTURERS' RESEARCH ASSOCIATION and MORPETH, J. C.: Gauging apparatus for the measurement of vacua.
565,074. STOKES, E. A., CRAWFORD, R. G. S., and VOKES, LTD.: Filters or cleaners for air and other gases.
565,124. BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD., and THOMAS, H.: Slicing machines.
565,129. RIHK, F. A.: Apparatus for vacuum sealing of jars or wide-mouthed bottles and the like.
565,495. LYONS AND CO., LTD., J., and HENDRICK, W. T. S.: Apparatus for applying wax and like materials to cardboard, paper and the like.
565,586. BOLTON'S SUPERHEATER AND PIPE WORKS, LTD., and BOLTON, E. A.: Valves for controlling the flow of fluids.
565,588. PORTEOUS, G.: Apparatus or mills for treating or grinding malt.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

PATELLA. — 628,183. Flavourings (other than essential oils), and flavourings partly of essential oils, the essential oils not predominating. **Watford and Company, Ltd.,** Heath Street, Newton Heath, Manchester, 10, Lancashire; Essence Distillers and Manufacturing chemists.

GIBRO. — 629,803. Canned meats and preserved meats. **Gibson Brothers (Liverpool), Ltd.,** 100 to 102, Kempston Street, Liverpool; Manufacturers and Merchants.

MILLMOOR.—630,126. Agricultural and horticultural products, grains, fresh fruits, fresh vegetables, and foodstuffs for animals. **G. and W. Collins, Ltd.,** Lancash House, 23/49, Tontine Street, St. Helens, Lancashire; Wholesale Grocers and Provision Importers.

SNOWBALL. — 630,591. Tapioca. **J. D. Brunt and Co., Ltd.,** City Buildings, Old Hall Street, Liverpool, 3; Manufacturers and Merchants.

New Companies

P. W. Biddulph, Limited. (389839.) Gold Medal Bakery, Graisley Lane, Wednesfield. To carry on bus. of biscuit manufacturers, bakers, confectioners, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: P. W. Biddulph and Elizabeth E. Biddulph, both of Graisley Lane, Wednesfield.

J. E. Downs and Sons, Limited. (389947.) 12, Broad Street, Bilston, Staffs. To take over bus. of a bacon curer carried on at Bilston, and the bus. of a butcher carried on at Bilston and Cradley Heath, as "J. E. Downs and Sons." Nom. cap.: £50,000 in 10,000 pref. and 40,000 ord. shares of £1 each. Dirs.: N. Downs, The Gables, Elm Avenue, Bilston (permt.), and Mrs. A. Adams, Baroda, Worcester Road, West Hagley.

Claptons (Worcester), Limited. (390063.) 31, Sidbury, Worcester. To take over bus. of bakers and confectioners carried on by Mary, Catherine and Francis Clapton, at 31, Sidbury, Worcester. Nom. cap.: £5,000 in £1 shares. Dirs.: Mary Clapton and Catherine Clapton, both of 31, Sidbury, Worcester; F. Clapton, 1, Rose Hill, London Road, Worcester.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.